TACMET Weather Station MAWS201MP

USER'S GUIDE

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Table of Contents

CHAPTER 1

GENERAL INFORMATION 7

About This Manual 7

Contents of This Manual 7

Feedback 8

Safety 8

General Safety Considerations 8

Product Related Safety Precautions 9

ESD Protection 11

Trademarks 11

License Agreement 12

Warranty 12

CHAPTER 2

PRODUCT OVERVIEW 13

Introduction to TACMET MAWS 13

MAWS Operating Software 15

Radiation Shield 15

AWS Logger QML102T 16

Power Supply and Connection Unit QMP202MP 17

Backup Battery 17

Battery Regulator QBR101 17

Power Supply Unit BWC15SXZ 17

Power Supply Unit BWT36SXZ 18

Power Strip QPS101 18

Transmitter WT501 19

Modem Module DMX501 19

Ultrasonic Wind Sensor WS425 20

Air Temperature and Relative Humidity Sensor QMH101M 21

Pressure Sensor PMT16A 22

Rain Gauge QMR101M 23

Ceilometer CT25KAM 23

Present Weather Detector PWD11A 24

Lightning Detector SA20M 25

Tiltable Pole Mast 26

Foundation Set 27

Guy Wires 28

Lightning Rod 29

Winch 29

Obstruction Light 30

Workstation with MIDAS IV Software 31

Communication Accessory Enclosure QCA101 32
Handheld Terminal QMD101M 32
Radio Modem 33
VHF Antennas 34
UHF Antennas 35
Mains Power Supply Module QMP211 36
Product Nomenclature 37

CHAPTER 3
OPERATION 39
Communication Connections 39
Handheld Terminal 40
Turning the Terminal On/Off 40
Keypad 41
Shift Key 41
Caps Lock Key 41
Function Key F1 41
Cursor Keys 42
Backspace Key 42
Enter Key 42
Ctrl Key 42
On/Off Key 42
Sequence of the Screens 43
Accessing the Screens 43
Main 44
Wind 45
Statistics 45
Enh/1 47
Enh/2 49
Alarms 50
Status 52
Setup 53
Terminal Connection 55
MIDAS IV Software 56
MIDAS IV TACMET Configuration Wizard 56
System Parameters Tab 58
Weather View Tab 59
Weather View 59
Screen 1 60
Screen 2 62
Screen 3 64
Changing Graphic Scales 65
Menu Options 65
Toolbar 67
Status Bar 67
METAR/SPECI Template 68
METAR/MET REPORT Manager 71
METAR/SPECI Editing Procedure 72
Checking and Editing Data Fields 72
Adding Remarks 74
Building the Report 74
Sending the Report 75
ASCII Log View 75

Event Monitor 77
Menu Options 78
Toolbar 79
Display Modes 80
Viewing Events 81
Acknowledging Events 81
Checking New Events 82
Event Messages 83
Diagnostics Monitor 84
Statuses Tab 85
ROA Object 86
Data Item Window 88
ROA User 90
SensorIO Monitor 91
Sensor Status Monitor Window 92
Event Log Window 95

CHAPTER 4
MAINTENANCE 97
Tilting the Mast 97
Ultrasonic Wind Sensor WS425 102
Present Weather Detector PWD11A 102
Cleaning Transmitter and Receiver Lenses and Hoods ... 102
Cleaning DRD Rain Detector 103
Storage 103
Lightning Detector SA20M 103
Obstruction Light 104
Antenna 104
Temperature and Relative Humidity Probe QMH101M 104
Replacing QMH101M Probe 104
Rain Gauge QMR101M 105
Pressure Sensor PMT16A 106
Calibration 106
Ceilometer CT25KAM 107
Window Cleaning 107
Storage 108
Logger Enclosure QME101M 108
Power Supply and Connection Unit QMP202MP 108
Mains Power Supply QMP211 108
Communication Accessory Enclosure QCA101 109
Handheld Terminal QMD101M 109
Cable Maintenance 109

CHAPTER 5
TROUBLESHOOTING 111
Software Operation 111
CT25KAM 112
Warnings 112
Failure Diagnosis 112

PWD11A **112**
SA20M **113**
Handheld Terminal **114**
Technical Support **114**
Return Instructions **115**

CHAPTER 6
TECHNICAL DATA **117**
Polling/Reporting Times **117**
Specifications **118**
Weather Station MAWS201MP 118
Logger QML102T 119
Power Supply and Connection Unit QMP202MP 120
Digital Transmitter WT501 123
Modem Module DMX501 124
Handheld Terminal QMD101M 125
Heated Ultrasonic Wind Sensor WS425 126
Pressure Sensor PMT16A 127
Air Temperature and Relative Humidity Sensor QMH101M 127
Rain Gauge QMR101M 127
Ceilometer CT25KAM 128
Present Weather Detector PWD11A 129
Lightning Detector SA20M 130
Obelux Obstruction Light 130
Tiltable Pole Mast 131
TM32 Radio Modem 133

List of Figures

Figure 1 TACMET MAWS System 14
Figure 2 Radiation Shield 15
Figure 3 Logger QML102T 16
Figure 4 Power Strip QPS101 18
Figure 5 Transmitter WT501 19
Figure 6 Modem Module DMX501 19
Figure 7 Ultrasonic Wind Sensor WS425 20
Figure 8 Installation Adapter for Ultrasonic Wind Sensors 21
Figure 9 QMH101M with Radiation Shield 21
Figure 10 Pressure Sensor PMT16A 22
Figure 11 Rain Gauge QMR101M 23
Figure 12 Ceilometer CT25KAM 23
Figure 13 Present Weather Detector PWD11A 24
Figure 14 Lightning Detector SA20M 25
Figure 15 Tiltable Pole Mast DKP210AV-T 26
Figure 16 Foundation Set for DKP206AV 27
Figure 17 Guy Wires Set 28
Figure 18 Passive Lightning Rod and the Holders 29
Figure 19 Winch 29
Figure 20 Obstruction Light with the Power Cable 30
Figure 21 MIDAS IV Workstation and QCA101 31
Figure 22 QMD101M Handheld Terminal 32

Figure 23 TM32 Radio Modem 33
Figure 24 VHF Antenna on the Tripod 34
Figure 25 VHF Antenna on the Mast 34
Figure 26 UHF Antenna on the Tripod 35
Figure 27 UHF Antenna on the Mast 35
Figure 28 Mains Power Supply Module QMP211 36
Figure 29 Handheld Terminal 40
Figure 30 Time Zones 55
Figure 31 Configuration Wizard 57
Figure 32 Weather View Tab 59
Figure 33 Weather View Screen 1: Basic System Data 60
Figure 34 Weather View Screen 2: Enhancement Data 62
Figure 35 Weather View Screen 3: Graphic Display 64
Figure 36 Changing the Scales 65
Figure 37 US METAR Template 68
Figure 38 METAR/MET REPORT Manager 72
Figure 39 ASCII Log View 75
Figure 40 Event Monitor Screen 77
Figure 41 Event Monitor Icon Showing Unacknowledged Events 80
Figure 42 Diagnostic Monitor Statuses Tab 85
Figure 43 Objects Window in Diagnostic Monitor 86
Figure 44 Data Item Window for PWD11A 89
Figure 45 Users Window in Diagnostic Monitor 90
Figure 46 Sensor Status Monitor Window 93
Figure 47 Sensor Details in Field Device Status Window 94
Figure 48 Event Log Window 95
Figure 49 MAWS201MP Mast Tilted 97
Figure 50 Mast Orientation 99
Figure 51 Bolts and Washers for Securing the Hinge 100
Figure 52 Tilted Mast with Tilting Support 101
Figure 53 Present Weather Detector (Arrow Pointing to DRD) 102
Figure 54 QMH101 Probe Maintenance 105

List of Tables

Table 1 TACMET MAWS201MP Nomenclature 37
Table 2 Cables Provided 38
Table 3 Main Screen Information 44
Table 4 Wind Screen Information 45
Table 5 Statistics Screen Information 46
Table 6 Reset Times for Precipitation Statistics 46
Table 7 First Enhancement Screen Information 47
Table 8 SYNOP Codes Used by PWD11A (Number Codes Not Seen on QMD101M) 48
Table 9 Second Enhancement Screen Information 49
Table 10 List of Possible Alarms 51
Table 11 Status Screen Information 52
Table 12 Station Dependent Settings 54
Table 13 Explanation of Configuration Wizard Buttons 58
Table 14 Explanation of System Parameters tab 58
Table 15 Parameters in Basic System Data Screen 61
Table 16 Parameters in Enhancement Data Screens 63
Table 17 Present Weather Codes (Qualifiers) 63
Table 18 Present Weather Codes (Phenomena) 63

Table 19 Parameters in Graphic Display....64
Table 20 Thresholds That Initiate Automatic SPECI Report....69
Table 21 Buttons in US METAR Template....69
Table 22 US METAR: Report Menu....70
Table 23 US METAR: Edit Menu....70
Table 24 US METAR: View Menu....70
Table 25 US METAR: Settings Menu....70
Table 26 US METAR: Help Menu....71
Table 27 US METAR: Toolbar Buttons....71
Table 28 Data Fields in METAR/SPECI Template....73
Table 29 History File Names and Content....76
Table 30 History File Column Indicators....76
Table 31 Event Messages....83
Table 32 Existence Column in Objects Window....87
Table 33 Color of Object Status Icon Explained....88
Table 34 Explanation of Connection Status Icon....93
Table 35 Explanation of Status Column....94
Table 36 Some Common Problems and Their Remedies....111
Table 37 Troubleshooting Ceilometer....112
Table 38 Troubleshooting SA20M....113
Table 39 Troubleshooting the Handheld Terminal....114
Table 40 Sensor Polling/Reporting Times....117
Table 41 MAWS201MP Specifications....118
Table 42 QML102T Specifications....119
Table 43 Battery Regulator QBR101 Specifications (Inside QMP202MP)....120
Table 44 Power Supply Unit BWT36SXZ Specifications (Inside QMP202MP)....121
Table 45 Power Supply Unit BWC15SXZ Specifications (Inside QMP202MP)....122
Table 46 12 Ah Backup Battery Specifications....122
Table 47 WT501 Specifications....123
Table 48 DMX501 Specifications....124
Table 49 QMD101M Specifications....125
Table 50 WS425 Specifications....126
Table 51 PMT16A Specifications....127
Table 52 QMH101M Specifications....127
Table 53 QMR101M Specifications....127
Table 54 CT25KAM Specifications....128
Table 55 PWD11A Present Weather Detector Specifications....129
Table 56 SA20M Specifications....130
Table 57 Obelux Obstruction Light Specifications....130
Table 58 DKP210AV-T Specifications....131
Table 59 DKP206AV-T Specifications....132
Table 60 TM32 Radio Modem Specifications....133

CHAPTER 1

GENERAL INFORMATION

This chapter provides important safety, revision history, and warranty information on the product.

About This Manual

This manual provides operation and maintenance information on MAWS201MP Automatic Weather Station for Pole Mast installations (also referred to as TACMET MAWS).

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information, provides important safety, revision history, and warranty information on the product.
- Chapter 2, Product Overview, introduces TACMET MAWS features, advantages, and the product nomenclature.
- Chapter 3, Operation, contains information that is needed to operate TACMET MAWS with the handheld terminal and MIDAS IV software.
- Chapter 4, Maintenance, provides information that is needed in the basic maintenance of the product.
- Chapter 5, Troubleshooting, consists of some common problems, their probable causes, and remedies.
- Chapter 6 Technical Data, provides the technical data of the TACMET Weather Station for Pole Mast Installations.

Feedback

Vaisala Customer Documentation Team welcomes your comments and suggestions on the quality and usefulness of this publication. If you find errors or have other suggestions for improvement, please indicate the chapter, section, and page number. You can send comments to us by e-mail: manuals@vaisala.com

Safety

General Safety Considerations

Throughout the manual, important safety considerations are highlighted as follows:

WARNING	Warning alerts you to a serious hazard. If you do not read and follow instructions very carefully at this point, there is a risk of injury or even death.

CAUTION	Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

NOTE	Note highlights important information on using the product.

Product Related Safety Precautions

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. They are recommended precautions that personnel must understand and apply during many phases of installations, operations and maintenance.

WARNING For safety reasons, do not install the mast alone.

WARNING For safety reasons, do not install the mast when wind speed is over 7 m/s (14 knots).

WARNING Always wear a safety helmet during mast installation.

WARNING Be careful when erecting or tilting the mast. See that there are no power lines or other obstacles above or behind the mast.

WARNING Secure the mast properly with guy wires to prevent it from falling. Tighten all the adjustment screws securely.

WARNING Be sure that there are no persons under the mast during erecting or tilting the mast.

WARNING When erecting the mast with the winch, avoid touching the wire with bare hands. Do not try to guide the wire.

WARNING To minimize shock hazard, the instrument chassis and cabinet must be properly grounded. The power cable must either be plugged into an approved electrical outlet or the instrument must be carefully grounded to a low-resistance safety ground.

WARNING Do not operate in an explosive atmosphere. Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a serious safety hazard.

WARNING Do not attempt to service the product or make any internal adjustment unless another person, capable of rendering first aid and resuscitation, is present.

WARNING Do not service alone. Under no circumstances should any person reach into parts and assemblies that are AC powered.

WARNING Operating personnel must not remove instrument covers. Component replacement or internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist for some time even with the power cable disconnected. To avoid injuries, disconnect power and discharge circuits before touching them.

WARNING Do not service a live system outdoors**.** Do not open the units outdoors when the enclosure contains line voltage levels.

CAUTION Do not install substitute parts or modify the unit. Improper modification can damage the product or lead to malfunction. Contact Vaisala for repairs to ensure that safety features are maintained.

CAUTION	Be careful not to damage the sensors when tilting the mast.

NOTE	Send old batteries to secondary lead smelter for recycling. Place neutralized slurry into sealed containers and handle in accordance to local, state, and federal regulations. Large water-diluted spills, after neutralization and testing, should be managed in accordance with approved local, state, and federal requirements. Consult state environmental agency and/or federal EPA (Environmental Protection Agency).

ESD Protection

Electrostatic Discharge (ESD) can cause immediate or latent damage to electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects inside the equipment housing.

To make sure you are not delivering high static voltages yourself:

- Handle ESD sensitive components on a properly grounded and protected ESD workbench. When this is not possible, ground yourself with a wrist strap and a resistive connection cord to the equipment chassis before touching the boards. When neither of the above is possible, touch a conductive part of the equipment chassis with your other hand before touching the boards.
- Always hold the boards by the edges and avoid touching the component contacts.

Trademarks

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All rights to any software are held by Vaisala or third parties. The customer is allowed to use the software only to the extent that is provided by the applicable supply contract or Software License Agreement.

Warranty

For certain products Vaisala normally gives a limited one-year warranty. Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

CHAPTER 2

PRODUCT OVERVIEW

This chapter introduces TACMET MAWS features, advantages, and the product nomenclature.

Introduction to TACMET MAWS

TACMET MAWS is an automatic weather station designed for permanent installation. TACMET MAWS accesses and processes data from its sensors, performs data quality control, as well as formats data for output in application specific formats. Figure 1 on page 14 shows the components of the TACMET MAWS system.

The AWS logger QML102T is located in the tube and is encased to protect the circuit board and the battery.

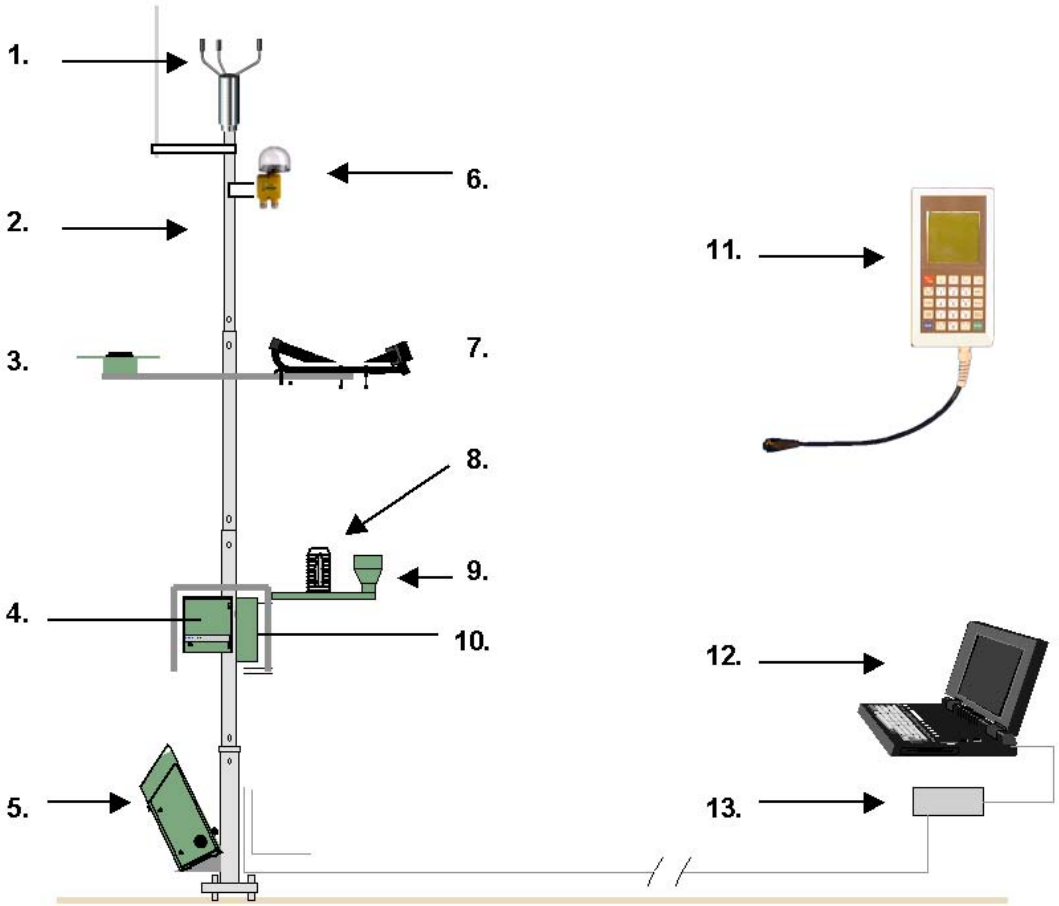


Figure 1 TACMET MAWS System

The following numbers refer to Figure 1 above:

1 = Heated Ultrasonic Wind Sensor
2 = Tiltable 6 m (20 ft) or 10 m (33 ft) mast
3 = Lightning Detector
4 = Power Supply and Connection Unit
5 = Ceilometer
6 = Obstruction Light
7 = Present Weather Detector
8 = Air Temperature and Relative Humidity Sensor
9 = Rain Gauge
10 = AWS Logger with Pressure Sensor
11 = Handheld Terminal
12 = MIDAS IV PC
13 = Communication Accessory Enclosure

MAWS Operating Software

The embedded operating software runs in the AWS logger QML102T. Access to the limited set of commands can be gained using the Handheld Terminal QMD101M or using MIDAS IV PC.

Radiation Shield

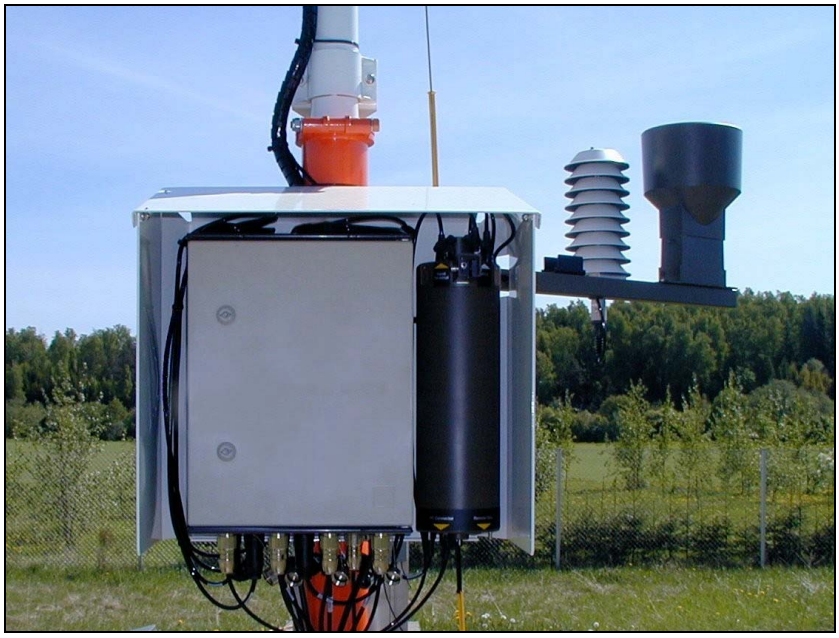


Figure 2 Radiation Shield

The radiation shield protects the QME101M logger tube, which is the same as with the mobile TACMET system, and the Power Supply and Connection Unit QMP202MP.

AWS Logger QML102T

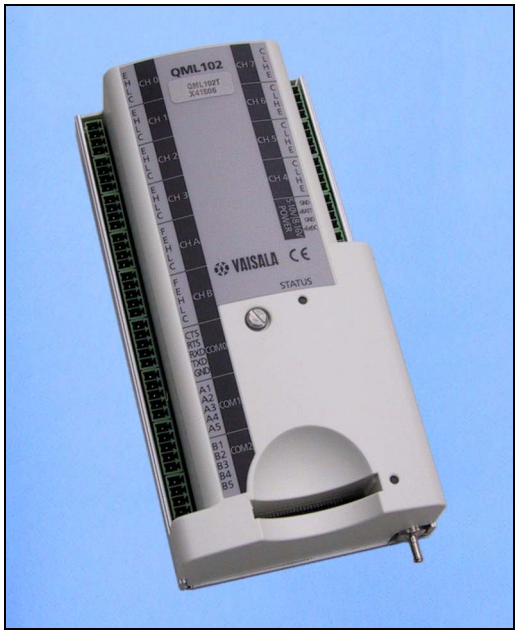


Figure 3 Logger QML102T

QML102T is a complete AWS logger designed on just one printed board. This board contains a 32 bit Motorola CPU for data processing and 10 differential (20 single ended) analog sensor inputs, that can also be used as digital inputs. Moreover, there are two frequency sensor interfaces, a 16 bit A/D converter, 1.7 Mbytes of secure Flash memory for data logging, and a charger for the internal backup battery.

The board uses the latest SMD (Surface Mount Device) technology and is conformal coated for improved protection also in high humidity. Each sensor input has a varistor (VDR) protection against induced transients. The maintenance terminal connection (RS-232, COM0) has transzorb diodes in its inputs.

In MAWS201MP the QML102T logger is located inside the logger tube QME101M and is further encased to protect the circuit board and the internal battery. The cover of this protective housing can be removed for installation of the battery and for maintaining MAWS.

Optional modules under the housing include, for example, various communication modules and a built-in pressure transducer.

Power Supply and Connection Unit QMP202MP

MAWS201MP (see Figure 2 on page 15) is a low-power system. When AC (mains) power (230 or 115 VAC) is available on the installation site, an AC (mains) power supply is used to charge the battery. QMP202MP includes the following modules: the backup battery, the battery regulator, AC (mains) power supply units, and the communication device. The unit is easily mounted under the radiation shield.

Backup Battery

QMP202MP houses a sealed and maintenance-free 12 Ah battery. The battery is charged with QBR101 Battery Regulator that is connected to the AC (mains) power supply.

Battery Regulator QBR101

Battery Regulator QBR101 is a charging and supervising instrument for 12/24 Volts lead acid and nickel-cadmium batteries. QBR101 allows input from AC (mains) power.

The maximum charging current can be set by the internal jumper settings either 0.5 A, 1.0 A, 2.0 A, or 2.5 A. QBR101 is applicable to a battery capacity of 4 to 72 Ah. Self-consumption from the battery is very low, less than 0.2 mA.

The LED lamps indicate battery regulator conditions. In order to maximize autonomy time, the LED lamps are activated only while pressing the ON button. QBR101 is a rail-mountable unit allowing for easy maintenance.

Power Supply Unit BWC15SXZ

The AC (mains) power supply unit BWC15SXZ is a switching power supply, which operates from the universal AC input of 85 to 264 VAC and 47 to 440 Hz. The output voltage is 15 VDC, which is used for powering the MAWS201MP system, and as an input to the battery regulator QBR101 for charging the backup battery. BWC15SXZ is installed inside QMP202MP on a standard DIN-rail enabling easy maintenance of the unit.

Power Supply Unit BWT36SXZ

The AC (Mains) power supply unit BWT36SXZ is a switching power supply, which operates from the universal AC input of 85 to 264 VAC and 47 to 440 Hz. The output voltage is 36 VDC, which is used for supplying heating power to Vaisala Ultrasonic Wind Sensor WS425. BWT36SXZ is installed inside QMP202MP on a standard DIN-rail enabling easy maintenance of the unit.

Power Strip QPS101

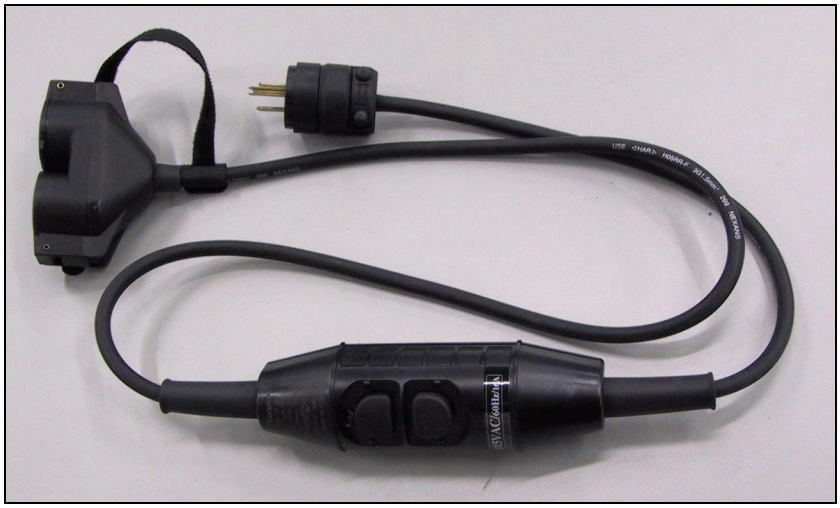


Figure 4 Power Strip QPS101

Power Strip QPS101 is a safety switch, which is used in connecting the QMP202MP to AC (mains) power outlet. QPS101 has two buttons: the test button for the circuit breaker and the current switch. The circuit breaker activates when the leakage is over 30 mA.

Transmitter WT501

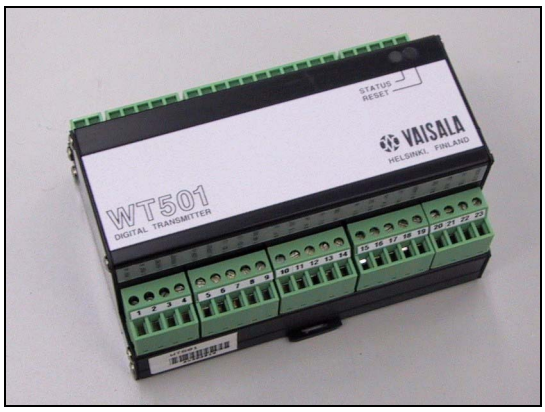


Figure 5 Transmitter WT501

The WT501 composes the digital transmitter PCB with connectors enclosed into an anodized aluminum profile with DIN-rail mounting. The unit is installed as such in an equipment enclosure designed to withstand the environmental conditions in question.

The data is provided via the onboard opto-isolated serial interface of the transmitter unit. For long distance communication in MAWS201MP, the transmitter is equipped with an isolated Modem Module DMX501.

Modem Module DMX501

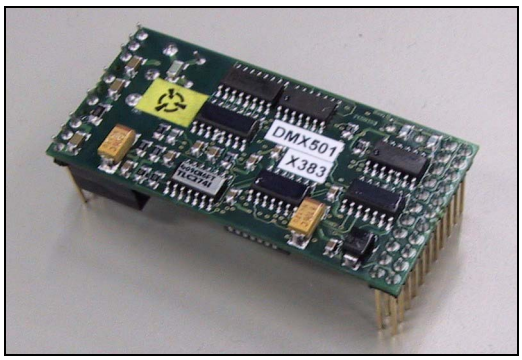


Figure 6 Modem Module DMX501

The DMX501 module is used for providing a long distance fixed-line connection between MAWS201MP and MIDAS IV PC, which has an RS-232 serial connection to a similar module installed inside the QCA101 unit.

Through this module, MAWS201MP sends reports and data or the MIDAS IV PC sends new settings to the logger. The modem module DMX501 is configured at the factory to use the communication standard V.22, 1200 bps DPSK

Ultrasonic Wind Sensor WS425

Figure 7 Ultrasonic Wind Sensor WS425

Ultrasonic Wind Sensor WS425 uses ultrasound to determine wind speed and wind direction. The sensor has no moving parts and it is resistant to corrosion and contamination The sensor has a built-in heater. The elements have a built-in thermostat to switch the heaters on when the transducer head needs it. The sensor needs 36 VDC to power the heater elements. When connected to MAWS201MP, the sensor uses the analog signal output providing wind speed and direction data.

An adapter for the Ultrasonic Wind Sensor is included in the mast delivery. It has a clamp for mast attachment and two holes for sensor attachment. See Figure 8 on page 21.

Figure 8 Installation Adapter for Ultrasonic Wind Sensors

Air Temperature and Relative Humidity Sensor QMH101M

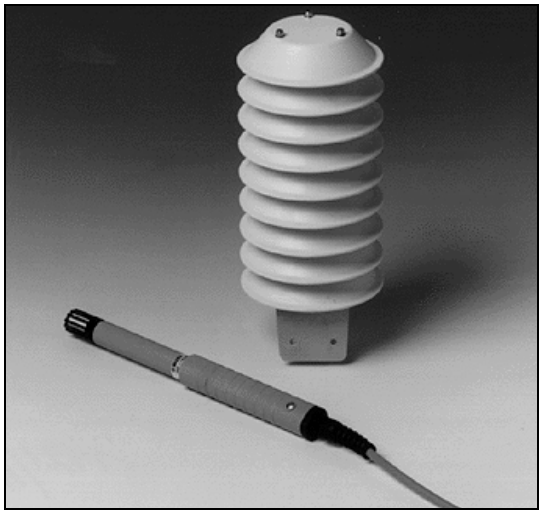


Figure 9 QMH101M with Radiation Shield

Air Temperature and Relative Humidity Sensor QMH101 is based on Vaisala's field-proven HMP45D probe and comes with a special cable and connector. For humidity measurements, the HUMICAP® sensor is highly accurate and offers excellent long-term stability in a wide range of environments. Temperature measurements are taken by an accurate Pt-100 IEC751, 1/3 Class B.

Replacement is simple; the probe head containing the electronics can be quickly removed from the probe body, while a replacement is

installed and the measurement continues. Meanwhile the other probe head can be calibrated.

The probe is installed in a naturally aspirated shield made of injection molded UV stabilized plastic. The shield has a multiplate design providing the necessary shielding from solar radiation and precipitation.

Pressure Sensor PMT16A

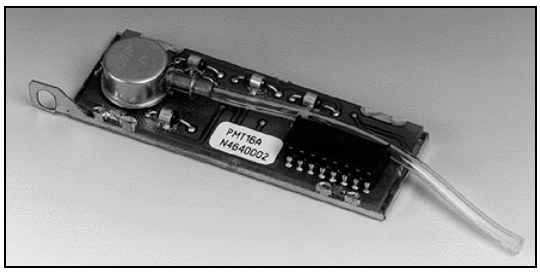


Figure 10 Pressure Sensor PMT16A

The silicon capacitive pressure sensor PMT16A has excellent accuracy, repeatability, and long-term stability over a wide range of operating temperatures. It maintains its accuracy and calibration for long periods of time, thus reducing the need for field calibrations.

The fine adjustment and calibration of the sensor at the factory are handled according to the electronic working standards, which are based on international standards.

Rain Gauge QMR101M

Figure 11 Rain Gauge QMR101M

Rain Gauge QMR101M is an economical and accurate rain gauge made of plastic, which is frostproof and highly resistant to UV-radiation. QMR101M has a self-emptying tipping spoon of 0.2 millimeters capacity. QMR101M comes with a ready-made cable and connector.

Ceilometer CT25KAM

Figure 12 Ceilometer CT25KAM

CT25KAM employs pulsed diode laser LIDAR (Light Detection and Ranging) technology for cloud detection, precipitation, and other obstructions to vision, and accurate cloud heights and vertical visibility determination.

The standard measurement range of CT25KAM extends up to 25 000 feet (7.5 km) covering most heights where dense clouds appear. The instrument is capable of reporting up to three cloud layers simultaneously. It detects the cloud base reliably in fog, rain, snow, and haze. If the cloud base is obscured, CT25KAM measures and reports vertical visibility.

Extensive internal monitoring is supported by a comprehensive set of user commands that can be given locally or remotely. Internal monitoring includes a sensor measuring the outgoing laser pulse energy, circuitry checking the receiver sensitivity, a sensor monitoring window contamination, and two sensors measuring the tilt angle. These and other internal measurements are used by the diagnostics software and the detection algorithm for maximum reliability and ease of use.

A special additional tilt sensor is provided as standard for automatically compensating uneven terrain. Installation is made easy and fast when no exact leveling is required. The cloud coverage algorithm in the CT25KAM is a further development of the algorithm specified by FAA. Cloud coverage (amount) is reported in 0 to 8 octas, according to WMO regulations.

Present Weather Detector PWD11A

Figure 13 Present Weather Detector PWD11A

Present Weather Detector PWD11A is an intelligent multivariable sensor for automatic weather observing systems. The sensor combines the functions of a forward scatter visibility meter and a present

weather sensor. In addition, PWD11A can measure the intensity and amount of both liquid and solid precipitation.

The versatility of PWD11A is achieved with a unique operating principle. PWD11A measures an estimate of the precipitation water content with a capacitive device and combines this information with optical scatter and temperature measurements. These three independent measurements together sufficiently provide data for an accurate evaluation of the prevailing visibility and weather type.

PWD11A is calibrated with reference to a highly accurate transmissometer. An extensive self-diagnostic procedure continuously monitors the sensor status. Dirt and foreign particles on the lens are detected automatically, minimizing the risk of false high values. A special calibration kit is provided as an option for conducting field calibration under practically all weather conditions.

PWD11A is small and lightweight, thus being easy to install on the sensor cross arm. In addition to the standard sensor operation, the MAWS software adds extra features such as reporting of coded weather type identifications as plain text in the output reports.

Lightning Detector SA20M

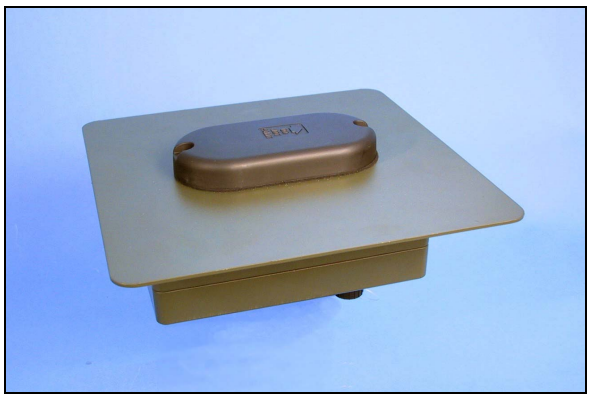


Figure 14 Lightning Detector SA20M

Lightning Detector SA20M detects the position of lightning activity and reports lightning and thunderstorm positions with respect to the location of SA20M. A stand-alone thunderstorm sensor is self-contained and weather-tight.

The SA20M sensor detects cloud-to-cloud, cloud-to-air and cloud-to-ground lightning activity to a range of 90 km (50 nmi.). The ability to detect inter-cloud activity allows SA20M to report lightning during

the building stages of a thunderstorm, before sufficient charge build-up has occurred that would generate a ground strike. Consequently, SA20M provides early warnings of potentially fatal single-event ground strikes.

Tiltable Pole Mast

Figure 15 Tiltable Pole Mast DKP210AV-T

DKP206AV-T and DKP210AV-T tiltable pole masts can be easily operated by one person when installing and maintaining the devices installed on the mast. Also special attention has been paid to easiness and quickness of the mast installation. The height of DKP206AV-T is 6 m (20 ft) and DKP210AV-T is 10 m (33 ft).

Foundation Set

The foundation set includes all the necessary installation accessories both for a new and an existing concrete pad.

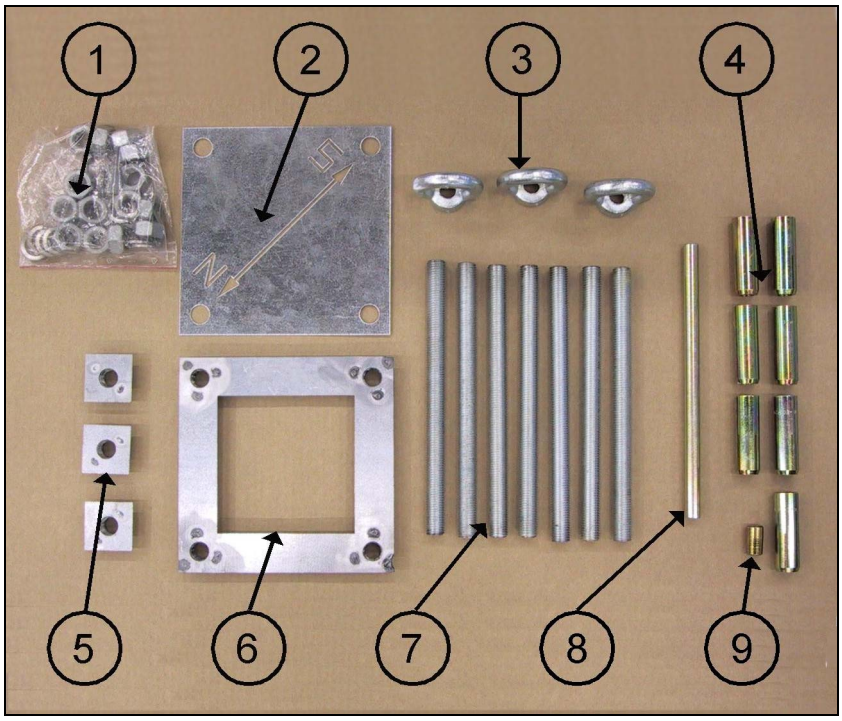


Figure 16 Foundation Set for DKP206AV

The following numbers refer to Figure 16 above:

1 = Nuts and washers for foundation bolts
2 = Orientation plate for the mast base
3 = The eye nuts for guy wires
4 = Wedge bolts for existing concrete block
5 = Plates with the nut for guy wire blocks
6 = Square plate for the mast base
7 = Foundation bolts
8 = Bar for the wedge bolts
9 = Key piece for the wedge bolts

Guy Wires

The DKP206AV-T mast is delivered with one set of guy wires, whereas DKP210AV-T is delivered with two sets. Figure 17 below shows the contents of one set of guy wires and the accessories. The top fastener of the guy wires is mounted to the uppermost tube of the mast during installation.

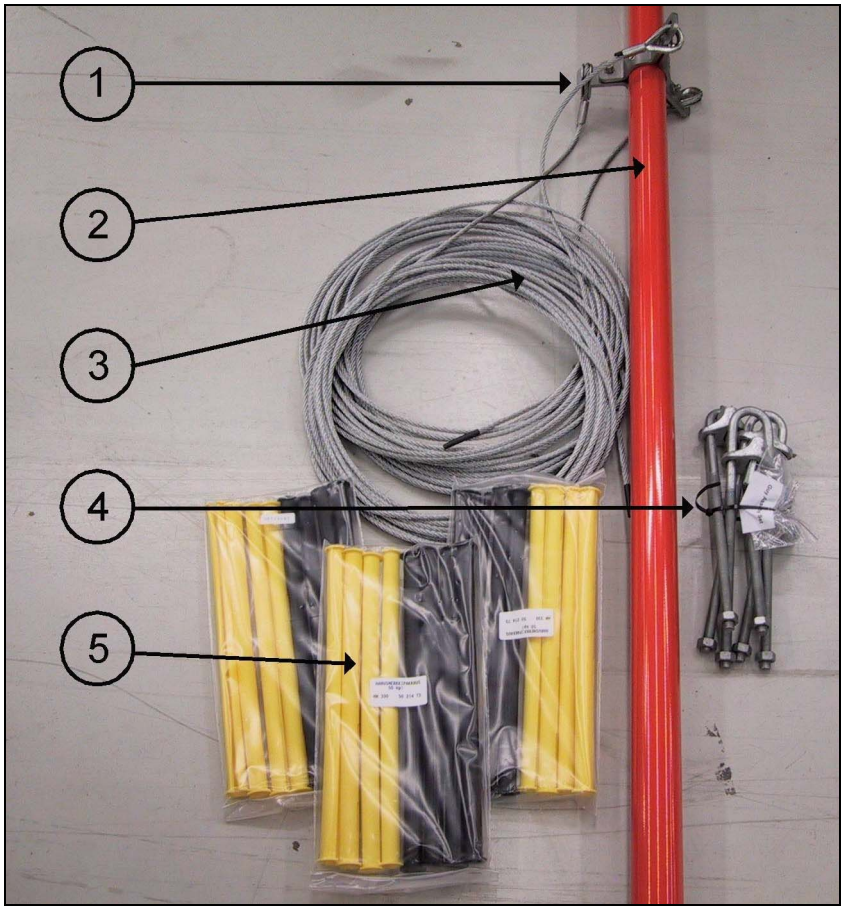


Figure 17 Guy Wires Set

The following numbers refer to Figure 17 above.

1 = Top fastener
2 = Upper mast tube
3 = Guy wires
4 = Installation accessories
5 = Cable shrouds

Lightning Rod

The mast is delivered with a passive lightning rod made from copper. The lightning rod holders are made of non-conductive material to protect the mast devices from overvoltage when lightning occurs. Refer to Figure 18 below. An active type of lightning rod is available as an option for areas where heavy lightning activity occurs frequently.

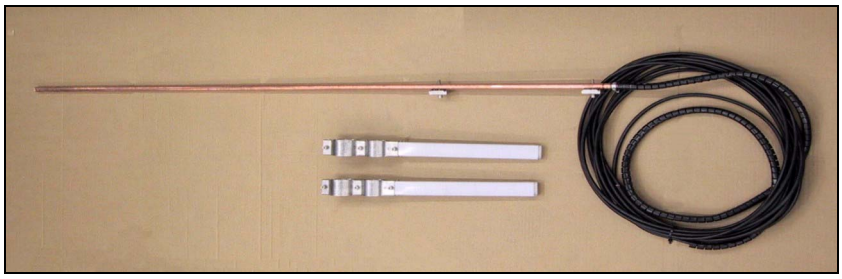


Figure 18 Passive Lightning Rod and the Holders

Winch

The winch is easily installed to the pedestal tube. After erecting the mast, the winch should be removed from the pedestal tube and stored in a dry and warm place.

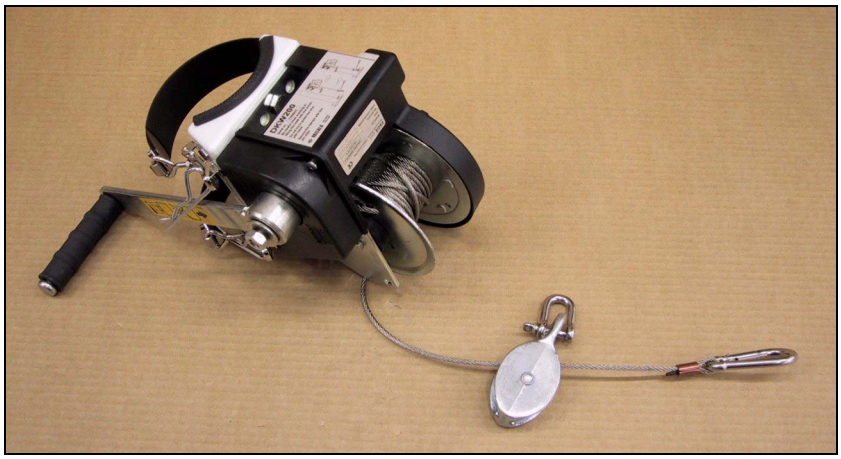


Figure 19 Winch

Obstruction Light

An obstruction light is included in the mast delivery. Obelux Obstruction Light is a very low power obstruction light utilizing LED technology with a typical intensity of 17 cd. The obstruction light is supplied with 12 VDC nominal supply voltage. The stabilized output of the light makes it possible that the variations of the supply voltage do not affect to the light output.

Figure 20 Obstruction Light with the Power Cable

Obelux Obstruction Light meets the specifications defined by ICAO. The obstruction light is provided with a mounting set for mast installation. The cabling and installation principles are similar to those of conventional obstacle lights, the only exception being the correct polarity required by the DC feed. Also, the power supply cable is included in the delivery by default.

Workstation with MIDAS IV Software

The workstation software MIDAS IV is installed onto a laptop PC. The MIDAS IV software operates in the Microsoft® Windows 2000® operating system, providing multi-tasking operation and connectivity. The workstation displays numerical and graphical data, codes METAR/SPECI aviation weather reports, as well as archives and transmits data for further processing. The Windows 2000® environment is user-friendly and provides great flexibility. MIDAS IV uses the standard Windows® user interface and features, and is therefore straightforward and easy to learn.

The workstation software facilitates editing METAR/SPECI reports by easy-to-use templates. Aviation special weather reports (SPECI) are generated automatically whenever selected criteria are met, or at any time initiated by the operator. Report transmission can also be fully automated, if necessary.

In addition, the software provides real-time graphical data display in multiple windows. Stored data can be viewed in ASCII format. The operator can monitor system performance and sensor alarms with Event Monitor.

Data is archived for 30 days on hard disk and sent to other systems via serial port or as an FTP transfer via LAN.

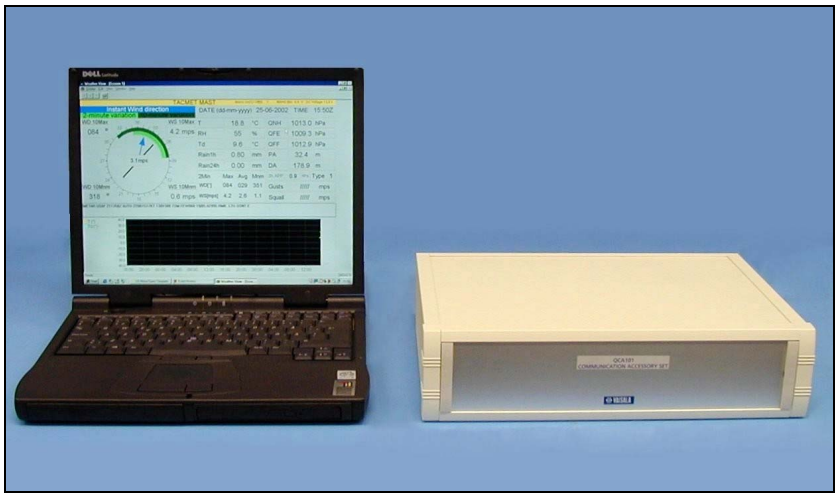


Figure 21 MIDAS IV Workstation and QCA101

Communication Accessory Enclosure QCA101

Communication Accessory Enclosure QCA101 houses Transmitter WT501 equipped with Modem Module DMX501. Additionally, AC (mains) power supply, lightning protection device, and surge arresters are located in the enclosure. In Figure 21 on page 31 the QCA101 enclosure is shown beside the MIDAS IV PC.

The maximum communication range with Modem Module DMX501 is up to 20 km (12 mi.) with a 22 AWG standard cable.

Handheld Terminal QMD101M

Figure 22 QMD101M Handheld Terminal

QMD101M is a lightweight, rugged and easy-to-read handheld display device for viewing measured and calculated parameters and systems alarms, as well as for setting station-specific parameters.

Radio Modem

Figure 23 TM32 Radio Modem

Radio modems provide wireless data communication between MAWS201MP and MIDAS IV PC.

TM32 Radio modem features a watertight design for operation in unprotected environments common in field applications. TM32 features a fully synthesized multi-channel radio that allows operation on all frequencies in the supported VHF or UHF bands.

VHF Antennas

The VHF antenna can be installed on the tripod (see Figure 24 below) or on the pole mast (see Figure 25 below). The frequency range is from 150 to 174 MHz.

Figure 24 VHF Antenna on the Tripod

Figure 25 VHF Antenna on the Mast

UHF Antennas

The UHF antenna can be installed on the tripod (see Figure 26 below) or on the pole mast (see Figure 27 below). The frequency range is from 410 to 470 MHz.

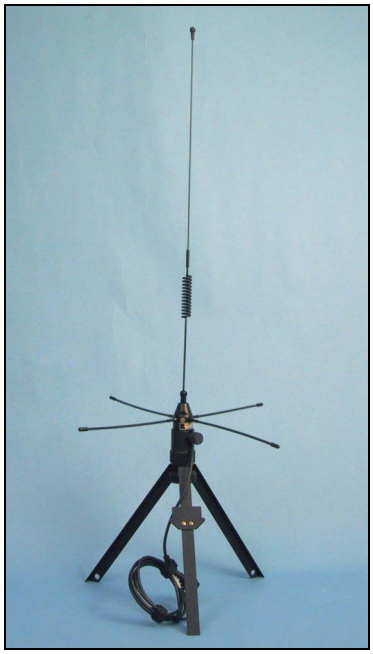


Figure 26 UHF Antenna on the Tripod

Figure 27 UHF Antenna on the Mast

Mains Power Supply Module QMP211

The AC (mains) power supply module QMP211 is a switching power supply, which operates from the universal AC input of 100 to 240 VAC and 50/60 Hz. The output voltage is 12 VDC (2500 mA), which is used for powering the radio modem when it is connected to the MIDAS IV PC for configuring.

Figure 28 Mains Power Supply Module QMP211

Product Nomenclature

Table 1 TACMET MAWS201MP Nomenclature

Code	Common Name
QML102T	Logger
PMT16A	Pressure sensor
QME101M	Logger tube
QMA102M	Sensor arm and radiation shield
WS425	Heated wind direction and speed sensor
QMH101M	Air temperature and relative humidity sensor
QMR101M	Rain gauge
DKP206AV-T	Tiltable pole mast and accessories (6 m, 20 ft)
DKP210AV-T	Tiltable pole mast and accessories (10 m, 30 ft)
DKW200	Winch for mast
QMD101M	Handheld terminal
TM32	Radio modem
QMX102SET-2	VHF Antenna Set (150 ... 174 MHz)
QMX101MSET-1	UHF Antenna Set (410 ... 430 MHz)
QMX101MSET-2	UHF Antenna Set (430 ... 450 MHz)
QMX101MSET-3	UHF Antenna Set (450 ... 470 MHz)
QMP211	Mains power supply for radio modem
QPS101	Outdoor power strip
Laptop PC	MIDAS IV PC
MIDAS IV	NT software for the MIDAS IV PC
CT25KAM	Ceilometer
PWD11A	Present weather detector
SA20M	Lightning detector
OBL10-12	Obstruction light
QMP202MP	Power supply and connection unit
QCA101	Communication accessory enclosure for PC end
WT501+DMX501	Communication module

Table 2 Cables Provided

Code	Common Name
ZZ45202	PC/Handheld connection cable with DC connector, 5 m (15 ft)
ZZ212024	WS425 Data/power cable for DKP206AV-T
ZZ212915	WS425 Data/power cable for DKP210AV-T
ZZ45214	AC cable, 5 m (15 ft)
CT45300	AC supply cable for CT25KAM
CT45298	DC/data cable for CT25KAM
ZZ45215	SA20M connection cable
ZZ45123	Data cable from QMP202MP to QME101M
ZZ212026	Data cable from QME101M to QMP202MP
ZZ212025	DC power cable between QMP202MP and QME101M
ZZ45114	Landline cable (3 pcs)
212019	Grounding cable
ZZ213068SPEC	Communication cable (length varies)
ZZ212027	Cable from QCA101 to TacLap PC

CHAPTER 3

OPERATION

This chapter contains information that is needed to operate TACMET MAWS with the handheld terminal and MIDAS IV software.

Communication Connections

There are four options for communication connections:

1. Hardwire connection between TACMET MAWS and the handheld terminal.
   - Connect the handheld terminal cable to the **Hand Terminal** connector (marked with a yellow arrow) on the upper base of TACMET MAWS. See section Handheld Terminal on page 40 for information on using the handheld terminal.
2. Hardwire connection between TACMET MAWS and the MIDAS IV PC.
   - Connect the landline cable to the **PC Connector** connector (marked with a yellow arrow) on the lower base of TACMET MAWS and to the MIDAS IV PC. See section MIDAS IV Software on page 56 for information on using the MIDAS IV software.
3. Modem connection between TACMET MAWS and the MIDAS IV PC.
   - See Installation Manual
4. RF connection between TACMET MAWS and the MIDAS IV PC.
   - See Installation Manual

Handheld Terminal

This chapter contains information that is needed for using the Handheld Terminal QMD101M.

The handheld terminal provides the following main functions:

- Paged screens for measurement and calculation results produced by the TACMET MAWS logger.
- Alarm screen, that shows active alarms.
- Setup screen for setting environmental variables such as time and altitude.

Figure 29 Handheld Terminal

Turning the Terminal On/Off

The terminal is powered by TACMET MAWS. To turn on the terminal, press and release the **On/Off** key. After a few seconds, the terminal stays on the Status screen. After startup, there might be some error messages. Ignore all of the error messages that come within the first five minutes.

To turn off the terminal, press and hold the **On/Off** key for a second.

Keypad

Shift Key

The alphabetic/numeric **Shift** mode key is used to shift the QMD101M keypad between the alphabetic and numeric modes.

Pressing and releasing the **Shift** key before pressing any other key, places the keypad in either numeric mode (the shift mode indicator displays **↓a**) or alphabetic mode (the shift mode indicator displays **←a** or **→a**). Use numeric mode for numbers and symbols (**-** and **.**), and alphabetic mode for symbols and letters located in the upper half of the keys.

For example, when the shift mode indicator displays **←a**, press key **1** to write a letter **C**. To write a letter **D**, change the shift mode to **→a** and press key **1**.

Caps Lock Key

Press the **Caps lock** key to place QMD101M in upper case mode (The shift mode indicator is an upper case "**A**"). While in upper case mode, pressing and releasing the **Shift** key will continue to place QMD101M in and out of alphabetic and numeric modes (the shift mode indicator will change between **↓A**, **←A** and **→A**). Press the **Caps lock** key again to place QMD101M in lower case mode.

Function Key F1

NOTE	The terminal mode is for maintenance purposes only.

The function key **F1** can be used to access terminal mode. The terminal mode can only be accessed from the Setup screen. The terminal mode is used to communicate with TACMET MAWS using written commands.

Turn the power off and on again to exit the terminal mode.

Cursor Keys

The down and up cursor keys (↓↑) are used to move through the various menu screens. The left and right cursor keys (←→) are used to move the cursor to the left and to the right.

Backspace Key

The **Backspace** key deletes the character to the left of the cursor and moves the cursor one step to the left.

Enter Key

The **Enter** key is used to accept information (for example a command) currently entered in an input field. In addition, it is used to scroll through the fields on the setup screen.

Ctrl Key

The **Ctrl** key is used in conjunction with other keys to perform special tasks (see section Status on page 52).

On/Off Key

To turn on QMD101M, press and release the **On/Off** key. To turn off QMD101M, press and hold down the **On/Off** key for a second.

NOTE	At any time, the key sequence **CTRL + ESC** terminates the current function or program and returns control of QMD101M to the FLOS (handheld terminal's embedded software) main menu system. To return to normal display, turn QMD101M off and on again.

Sequence of the Screens

The display has eight different screens in the following order:

1. Main
2. Wind
3. Stat
4. Enh/1
5. Enh/2
6. Alarms
7. Status
8. Setup

Accessing the Screens

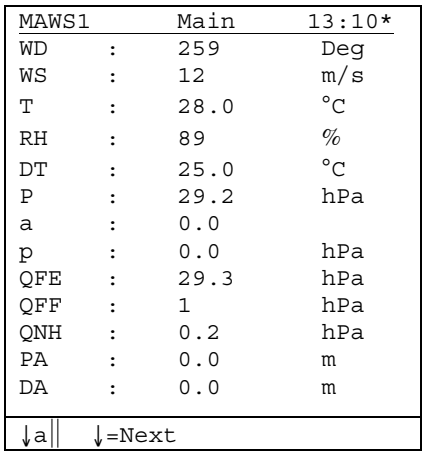
The screens are organized in a sequential manner, in the order explained in section Sequence of the Screens on page 43.

The following keys are used for accessing the screens:

- Down arrow (load next screen)
- Up arrow (load previous screen)

When you turn the QMD101M power on you will see the Status screen (after the Welcome screen). Press the ↑ key six times to get the Main screen.

Main



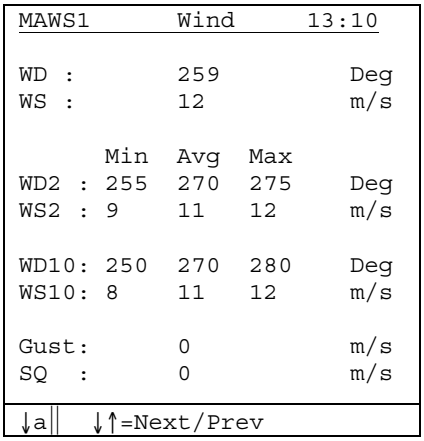
The Main screen shows the key values of the standard measurements and calculations.

Table 3 Main Screen Information

Screen text	Measurement	Unit SI (US)	Note
MAWS1			Station name
Main			Screen name
13:10			Current time
*			The handheld terminal receives data when the asterisk is seen.
WD	Wind direction	Deg	
WS	Wind speed	m/s (kt)	
T	Air temperature	°C (°F)	
RH	Relative humidity	%	
DT	Dew point	°C (°F)	
P	Barometric pressure	hPa (inHg)	
a	Pressure tendency	code 0 ... 8	Available after 3 hours
p	Pressure trend (3 h)	hPa (inHg)	Available after 3 hours
QFE	Field pressure	hPa (inHg)	
QFF	Sea-level pressure	hPa (inHg)	
QNH	Altimeter setting	hPa (inHg)	Available after 5 minutes
PA	Pressure altitude	m (ft)	
DA	Density altitude	m (ft)	

Wind

Press ↓ on the Main screen to get to the Wind screen:


MAWS1 Wind 13:10
WD : 259 Deg
WS : 12 m/s
Min Avg Max
WD2 : 255 270 275 Deg
WS2 : 9 11 12 m/s
WD10: 250 270 280 Deg
WS10: 8 11 12 m/s
Gust: 0 m/s
SQ : 0 m/s
↓a ↓↑=Next/Prev

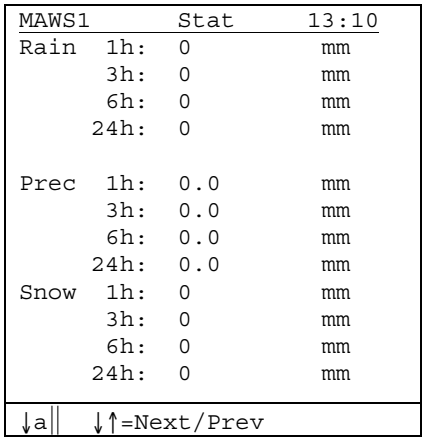
The Wind screen shows instant and statistical wind information.

Table 4 Wind Screen Information

Screen label	Measurement	Unit SI (US)
WD	Wind direction	Deg
WS	Wind speed	m/s (kt)
Min	Minimum values	
Avg	Average values	
Max	Maximum values	
WD2	Wind direction, 2-minute values	Deg
WS2	Wind speed, 2-minute values	m/s (kt)
WD10	Wind direction, 10-minute values	Deg
WS10	Wind speed, 10-minute values	m/s (kt)
Gust	Wind gust speed	m/s (kt)
SQ	Wind squall speed	m/s (kt)

Statistics

Press ↓ on the Wind screen to get to the Statistics screen:



The Statistics screen shows statistic values of liquid and solid precipitation.

Table 5 Statistics Screen Information

Screen label	Measurement	Unit SI (US)
Rain 1h	Last one-hour floating precipitation sum from QMR101M	mm (in)
Rain 3h	Last three-hour precipitation sum from QMR101M	mm (in)
Rain 6h	Last six-hour precipitation sum from QMR101M	mm (in)
Rain 24h	24-hour precipitation sum from QMR101M (starting at 00:00 am)	mm (in)
Prec 1h	Last one-hour precipitation sum from PWD11A	mm (in)
Prec 3h	Last three-hour precipitation sum from PWD11A	mm (in)
Prec 6h	Last six-hour precipitation sum from PWD11A	mm (in)
Prec 24h	Last 24-hour precipitation sum from PWD11A	mm (in)
Snow 1h	Last one-hour snow sum from PWD11A	mm (in)
Snow 3h	Last three-hour snow sum from PWD11A	mm (in)
Snow 6h	Last six-hour snow sum from PWD11A	mm (in)
Snow 24h	Last 24-hour snow sum from PWD11A	mm (in)

Precipitation statistics (water and snow sums) are synchronized to UTC. Reset times for statistics are shown in Table 6 below:

Table 6 Reset Times for Precipitation Statistics

Statistic	Reset Times
3 h	02:55, 05:55, 08:55, 11:55, 14:55, 17:55, 20:55, and 23:55
6h	05:55, 11:55, 17:55, and 23:55
24h	11:55

NOTE If precipitation is snow, Prec 1h to 24h values show the liquid equivalent and Snow 1h to 24h values show the snow thickness. The values are updated once per hour.

Enh/1

Press ↓ on the Statistics screen to get to the first Enhancement screen (Enh/1):

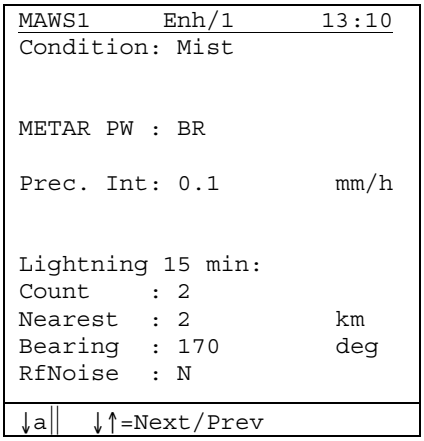


Table 7 First Enhancement Screen Information

Screen Label	Measurement	Unit SI (US)
Condition	Textual representation of the present weather code from PWD11A. Table 8 on page 48 lists present weather codes.	
METAR PW	METAR message present weather code (see Table 17 on page 63 and Table 18 on page 63).	
Prec. Int.	Precipitation intensity from PWD11A	mm/h (in/h)
Lightning 15 min	Last 15 min lightning values	
Count	Number of lightning strikes in 15 minutes	/min
Nearest	Distance to nearest lightning strike	km (sm)
Bearing	Direction to nearest lightning strike	deg
RfNoise	SA20M skinmap information: N (None), L (Low), M (Medium), and H (High).	

Table 8 SYNOP Codes Used by PWD11A (Number Codes Not Seen on QMD101M)

PW Code	Textual Representation
00	Clear
04	Haze or smoke (vis ≥ 1 km)
05	Haze or smoke (vis < 1 km)
10	Mist
20	Fog [1)]
21	Precipitation [1)]
23	Rain (not freezing) [1)]
24	Snow [1)]
25	Freezing rain or freezing drizzle
30	Fog [2)]
31	Fog or ice fog, in patches [2)]
32	Fog or ice fog, has become thinner during past hour [2)]
33	Fog or ice fog, no appreciable change during past hour [2)]
34	Fog or ice fog, has begun or become thicker during past hour [2)]
40	Precipitation
41	Precipitation, slight or moderate
42	Precipitation, heavy
50	Drizzle
51	Drizzle, not freezing, light
52	Drizzle, not freezing, moderate
53	Drizzle, not freezing, heavy
54	Drizzle, freezing, light
55	Drizzle, freezing, moderate
56	Drizzle, freezing, heavy
60	Rain
61	Rain, light
62	Rain, moderate
63	Rain, heavy
64	Rain, freezing, light
65	Rain, freezing, moderate
66	Rain, freezing, heavy
67	Rain (or drizzle) and snow, light
68	Rain (or drizzle) and snow, moderate or heavy
70	Snow
71	Snow, light
72	Snow, moderate
73	Snow, heavy
74	Ice pellets, light
75	Ice pellets, moderate
76	Ice pellets, heavy
80	Showers or intermittent precipitation
81	Rain showers, light
82	Rain showers, moderate
83	Rain showers, heavy
84	Rain showers, violent
85	Snow showers, light
86	Snow showers, moderate
87	Snow showers, heavy
90	Thunderstorm

PW Code	Textual Representation
91	Thunderstorm, slight or moderate, no precipitation
92	Thunderstorm, slight or moderate, rain/snow
94	Thunderstorm, heavy, no precipitation
95	Thunderstorm, heavy, rain/snow

1) Codes are used if precipitation or fog was observed during the preceding hour but not at the time of observation.
2) Codes are used if precipitation or fog is observed at the time of observation.

Enh/2

Press ↓ on the first Enhancement screen (Enh/1) to get to the second Enhancement screen (Enh/2):

```
MAWS1       Enh/2      13:10

H Vis 10A:     5400         m



Cloud    Octas    Height    m
L1         3       640
L2         5       880
L3         8       1040
L4         /       /////
L5         /       /////
V Vis

↓a|   ↓↑=Next/Prev
```

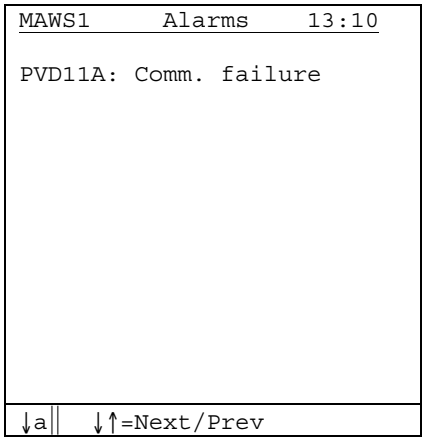
NOTE Vertical visibility (V Vis) is available only when the sky is clear of clouds. If any clouds are detected, the vertical visibility measurement is not available.

Table 9 Second Enhancement Screen Information

Screen Label	Measurement	Unit SI (US)
H Vis 10A	10-minute average horizontal visibility measured by PWD11A	m (sm)
Cloud	Cloud bases L1 to L5. L1 is the lowest cloud base.	
Octas	Sky condition categories.	1 to 8 octas
Height	Height of the cloud base.	m (ft)
/////	The cloud base does not exist.	
V Vis	Vertical visibility measured by CT25KAM.	m (ft)

Alarms

Press ↓ on the Enh/2 screen to get to the Alarms screen:



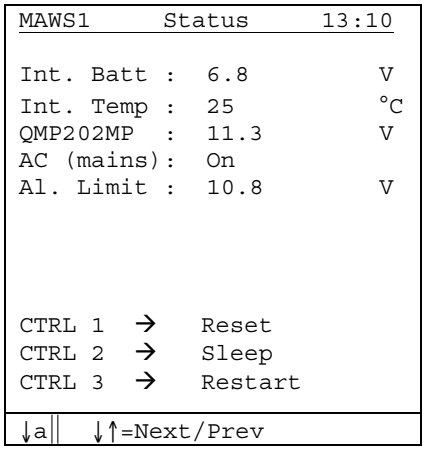
The Alarms screen shows active alarms. If an alarm is triggered, the Alarms screen will appear automatically. Press ESC key to return to the previous screen, or press Enter to acknowledge the alarm message.

Table 10 List of Possible Alarms

Alarm	Explanation and Possible Remedy
CT25KAM: Comm. failure	Communication failure. Verify correct cable connections or replace sensor.
CT25KAM: HW alarm/warning	Hardware error on CT25KAM.
CT25KAM: Optics contamin.	CT25KAM optics contaminated. Clean the optics.
QMP202MP: Battery low	QMP202MP battery low. Connect QMP202MP to an AC outlet.
AC (mains): Off	QMP202MP is not connected to AC outlet.
PMT16: Air press. misg.	Air pressure value missing. Not user serviceable.
PWD11A: Comm. failure	Communication failure. Verify correct cable connections or replace sensor. QMP202MP battery empty or hardware failure.
PWD11A: HW alarm/warning	Hardware error on PWD11A.
PWD11A: Optics contamin.	PWD11A optics contaminated. Clean the optics.
QMD101M: Comm. failure	Communication failure. Verify correct cable connections or replace handheld terminal.
QMH101M: Air temp. misg.	Air temperature value missing. Verify correct cable connections or replace sensor.
QMH101M: Humidity misg.	Humidity value missing. Verify correct cable connections or replace sensor.
QMR101M: Rain gauge misg.	Rain gauge missing. Verify cable connections.
SA-20: Comm. failure	Communication failure. Verify correct cable connections or replace sensor.
SA-20: HW alarm/warning	Hardware error on SA20M.
SA-20: Skinmap rate high	Too much electrical interference. Remove interfering equipment.
WS425: Wind dir. misg.	Wind direction value missing. Verify correct cable connections or replace sensor.

Status

Press ↓ on Alarms screen to get to the Status screen:



The Status screen shows voltage information and internal temperature of the TACMET MAWS logger.

Table 11 Status Screen Information

Screen label	Explanation	Limit value
Int. Batt	Internal battery voltage of MAWS (V)	5.5 ... 7.6 V
Int. temp	Internal temperature of MAWS (°C or °F)	-40 ... +80 °C -40 ... +176 °F
QMP202MP	Battery voltage of QMP202MP (V)	10 ... 16 V
AC (mains)	AC power to MAWS (ON/OFF)	
Al Limit	MAWS sends an alarm to the handheld terminal when the QMP202MP voltage drops below the set limit.	
CTRL 1	Press CTRL+1 to reset MAWS	
CTRL 2	Press CTRL+2 to put MAWS into sleep mode. MAWS wakes up when you connect the handheld terminal and turn it on.	
CTRL 3	Press CTRL+3 to restart MAWS from sleep mode.	

Setup

Press ↓ on the Status screen to get to the Setup screen.

```
          Setup

Name  : MAWS1
Time  : hh mm ss YY MM DD
        13 10 00 03 10 29
Timez : 2.0
Alt   : 21.7 m
Pslev : 1.1  m
WindC : 0.0
Rf-HT : 1
Rf-PC : 1
Sys.T : 1
Enh.  : 1
Units : 0

↓a|   ↑=Prev
```

NOTE When taking TACMET MAWS into use for the first time or upon connecting the battery, the station dependent settings must be checked. All the settings (excluding Name) are mandatory.

NOTE When changing the station dependent settings, connect the handheld terminal to TACMET MAWS with a hard wire.

To change the station dependent settings do as follows:

1. Press **Enter** to move to the desired field.
2. When the cursor is on the desired field, press **Space** to get the input field.
3. Wait until the square brackets appear and type a value (use shift modes as explained in section Shift Key on page 41).
4. After typing a value, press **Enter** to accept the new value. If you do not type a new value and you press **Enter** the value remains unchanged.
5. Reset the station (see section Status on page 52) after you have changed station dependent settings.

NOTE If you are not able to get the input field, it means that there is a communication problem between TACMET MAWS and the handheld terminal. See section troubleshooting the Handheld Terminal on page 114.

Table 12 Station Dependent Settings

Screen label	Setting
Name	Select a desired station name (max. 8 characters). The station name is a static parameter and will remain after power off.
Time	Time and date. Set the time according to the example. To set only the time, type for example 13 15 00 (hh mm ss).
Timez	Time zone sets the time difference from UTC. For example, enter -5 in the eastern USA (New York, for example). For details, see Figure 30 on page 55.
Alt	Station altitude from sea level. Use the same unit as selected in the Units-field.
Pslev	Pressure sensor altitude from the ground (station level). Use the same unit as selected in the Units-field.
WindC	Should always be set to 0 in mast installations.
Rf-HT	Select the desired radio channel (0 ... 15) for the radio connected to the Hand Terminal connector on the upper base of the logger tube. This may take up to 1 min. Set channel to -1 to pause radio transmission.
Rf-PC	Select the desired radio channel (0 ... 15) for the radio connected to the PC connector on the lower base of the logger tube. This may take up to 1 min. Set channel to -1 to pause radio transmission.
Sys.T	System Type: 0 = deployable, 1 = mast installation
Enh	Enhancement sensors included in configuration. 0 = Not included, 1 = Included. Set to 1 in mast installations.
Units	Display unit: 0 = SI units, 1 = US units. Display unit will change when a value is logged the next time.

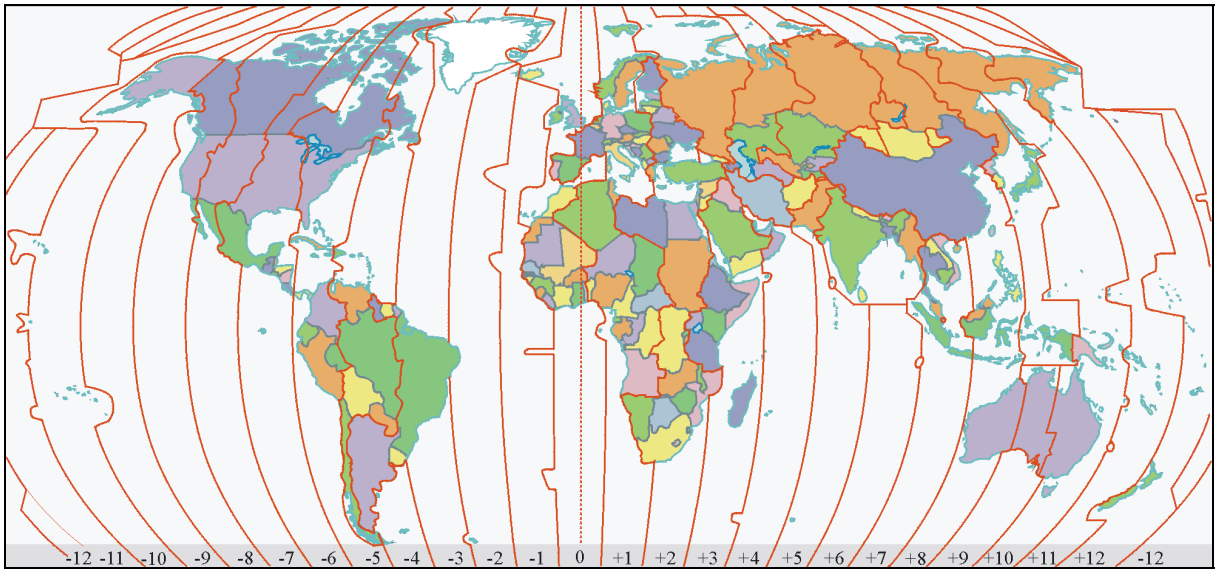


Figure 30 Time Zones

Terminal Connection

NOTE	The terminal mode is for maintenance purposes only.

When you are on the Setup screen, press F1 to start a terminal connection.

To close the terminal connection, turn the power off and on again.

MIDAS IV Software

This section contains detailed information on operating TACMET MAWS with the MIDAS IV software.

The MIDAS IV software collects measured and calculated data from the TACMET MAWS systems. In addition, it automatically generates METAR reports, archives data for 30 days on the hard disk or any other selected storage media, and distributes data further to other systems. MIDAS IV allows the user to edit the METAR reports with easy-to-use templates. Moreover, MIDAS IV provides the Event Monitor option, with which the operator can monitor the system and sensor alarms.

MIDAS IV data can be accessed through four workstation applications. These applications are:

- **Weather View** for data display
- **US METAR Template** for sending a METAR/SPECI message
- **Event Monitor** for viewing and acknowledging events
- **ASCII Log View** for viewing stored history data.

MIDAS IV TACMET Configuration Wizard

Double-click the **Configuration Wizard** icon on the desktop to open the Configuration Wizard application.

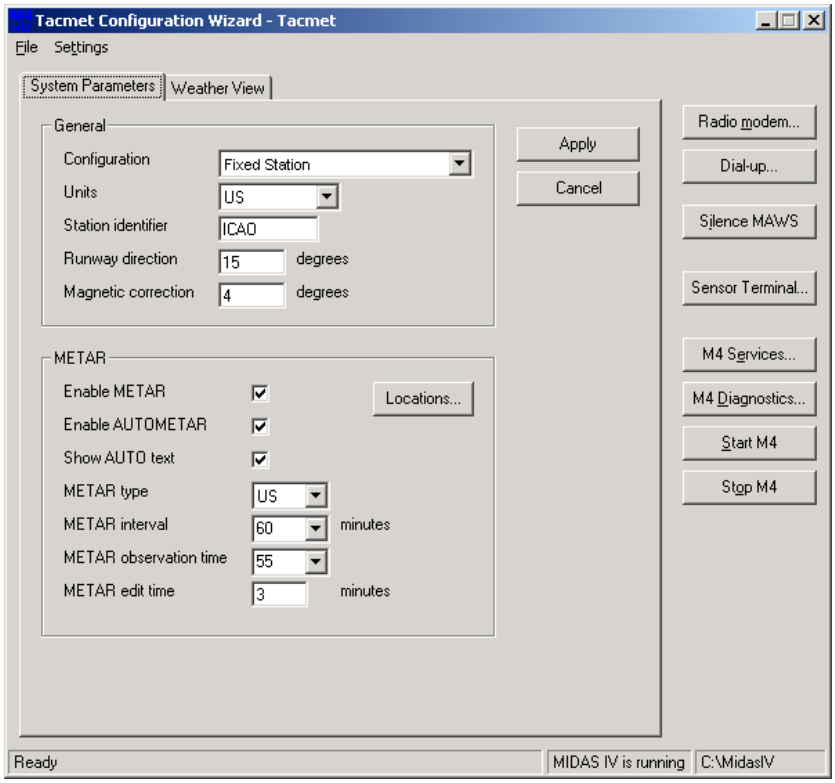


Figure 31 Configuration Wizard

The Configuration Wizard includes two menus: **File** and **Settings**. From the **File** menu, you can browse log files, exit Configuration Wizard, or read the version information. The **Settings** menu has two menu items: **Radio modem** and **Dial-up**.

The **Radio modem** sub-menu has three items: **Use radio modem**, **Radio modem channel**, and **Configuration software**. **Use radio modem** -item is used to enable/disable radio modem. **Radio modem channel** -item is used to select the pre-configured radio channel. **Configuration software** -item is used to select an application for configuration of the radio modem.

The optional **Dial-up** sub-menu has two items: **Use Dial-up** and **Configuration software**. **Use Dial-up**-item is used to enable/disable dial-up connection, for example, satellite connection. **Configuration software** -item is used to select an application for configuration of the dial-up connection.

Table 13 on page 58 lists the Configuration Wizard buttons.

Table 13 Explanation of Configuration Wizard Buttons

Button	Explanation
Radio Modem	Opens Radio Modem Configuration program
Dial-up	Opens optional Dial-up Manager
Silence MAWS/ Enable MAWS	Silences MAWS Asks which radio channel to use and then enables MAWS
Sensor Terminal	Opens Sensor Terminal application
M4 Services	Opens MIDAS IV Service Manager
M4 Diagnostics	Opens Diagnostics Monitor
Start M4	Starts MIDAS IV applications
Stop M4	Stops MIDAS IV applications
Apply	Accepts configuration changes
Cancel	Cancels configuration changes
Locations...	Opens METAR/SPECI Manager application

System Parameters Tab

From the System Parameters tab (see Figure 31 on page 57), you can configure the parameters described in Table 14 below.

Table 14 Explanation of System Parameters tab

Item	Description
Configuration	Select your system configuration: 1 Basic station, 1 Enhancement station, Basic and Basic stations, Enhancement and Basic stations, Enhancement and Enhancement stations, or Fixed Station (mast installation).
Units	Select the units you want to use: SI or US
Station identifier	The unique ICAO identifier with 4 characters when the METAR message is sent to AFTN. Otherwise, give the station ID, for example, airfield name.
Runway direction	Give the Runway direction in degrees, for example, 20
Magnetic correction	Give the difference between magnetic north and true north
Enable METAR	Check only if you want the system to generate METAR/SPECI messages
Enable AUTOMETAR	Check only if you want to enable automatic METAR/SPECI sending feature
Show AUTO text	Check only if you want the AUTO text to appear in the header of METAR/SPECI message
METAR type	Select METAR/SPECI type: US or ICAO
METAR interval	Select METAR/SPECI sending interval in minutes: 30 or 60
METAR observation time	Select METAR/SPECI editing start time: 00, 05, 10, 15, 20, 25, 30, 35, 40, 45, 50, or 55 minutes past the hour
METAR edit time	Select the desired METAR/SPECI editing time in minutes, for example 3.

Weather View Tab

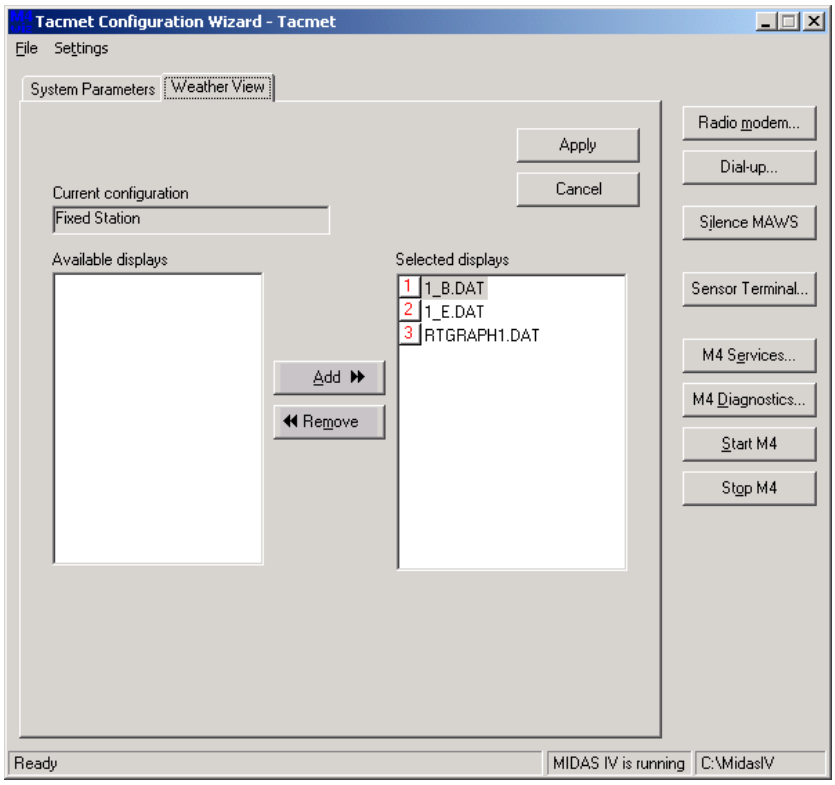


Figure 32 Weather View Tab

With the **Weather View** tab, you can configure the amount and the order of the displays in the Weather View application.

NOTE	Normally there is no need to modify the display settings.

Weather View

Weather View is an application for graphical and numerical presentation of TACMET MAWS values. The application updates real-time values constantly as the system receives new data from the sensors.

The various Weather View screens, available in the application, make it easier for the user to follow the Basic system and Enhancement data.

NOTE	The number and content of the screens depends on the configuration of your system and may differ from the ones presented in this manual.

Screen 1

The Weather View application is composed of several screens. When one TACMET MAWS is connected to MIDAS IV PC, the screen 1 shows basic system data.

NOTE	The order of the screens depends on the settings made with the configuration wizard program.

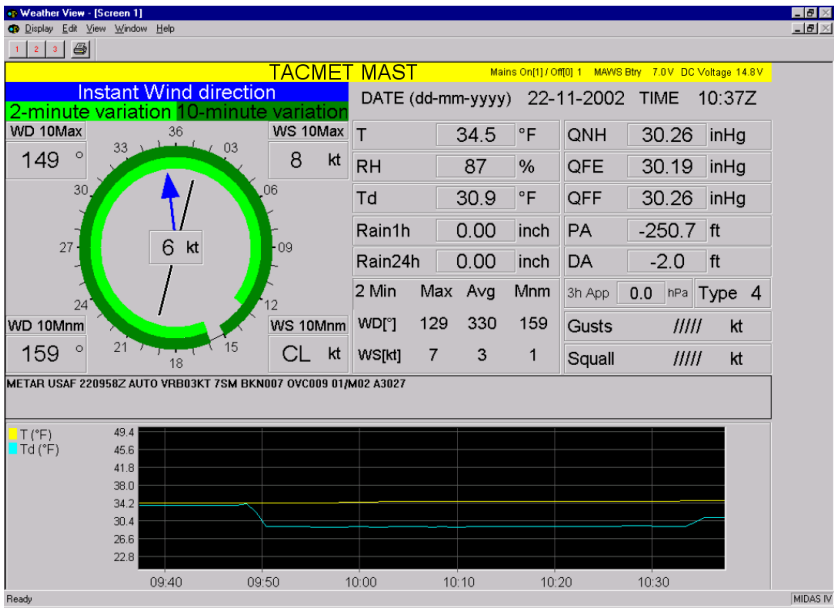


Figure 33 Weather View Screen 1: Basic System Data

NOTE	The values marked with a red color after a startup are updated after 10 minutes.

Table 15 Parameters in Basic System Data Screen

Field	Description
TACMET MAST	Weather station identification
Mains ON/OFF	AC power to MAWS (ON [1] / OFF [0])
MAWS Btry	Internal battery voltage of MAWS (V)
DC Voltage	Battery voltage of QMP202MP (V)
DATE	Current date
TIME	Current time
Runway direction	Black line shows runway direction
Instant Wind direction	Blue arrow shows instant wind direction
2-minute variation	Light green area shows 2-minute variation
10-minute variation	Dark green area shows 10-minute variation
WD 10Max	Shows 10-minute wind direction maximum
WS 10Max	Shows 10-minute wind speed maximum
Rectangle in the middle of the wind rose	Shows instant wind speed value
WD 10Mnm	Shows 10-minute wind direction minimum
WS 10Mnm	Shows 10-minute wind speed minimum
T	Air temperature
RH	Relative humidity
Td	Dew point
Rain 1h	1-hour precipitation value (QMR101M)
Rain 24h	24-hour precipitation value (QMR101M)
Max	Maximum wind values (2-min)
Avg	Average wind values (2-min)
Mnm	Minimum wind values (2-min)
WD	Wind direction
WS	Wind speed
QNH	Altimeter setting
QFE	Station pressure
QFF	Sea-level pressure
PA	Pressure altitude
DA	Density altitude
3h App	Pressure trend (3-hour difference)
Type	Pressure type 0 ... 8
Gusts	Shows gusts speed
Squall	Shows squall speed

Follow the instructions in section Changing Graphic Scales on page 65 to change the scales of the temperature diagram.

Screen 2

Screen 2 shows Enhancement data from TACMET MAWS.

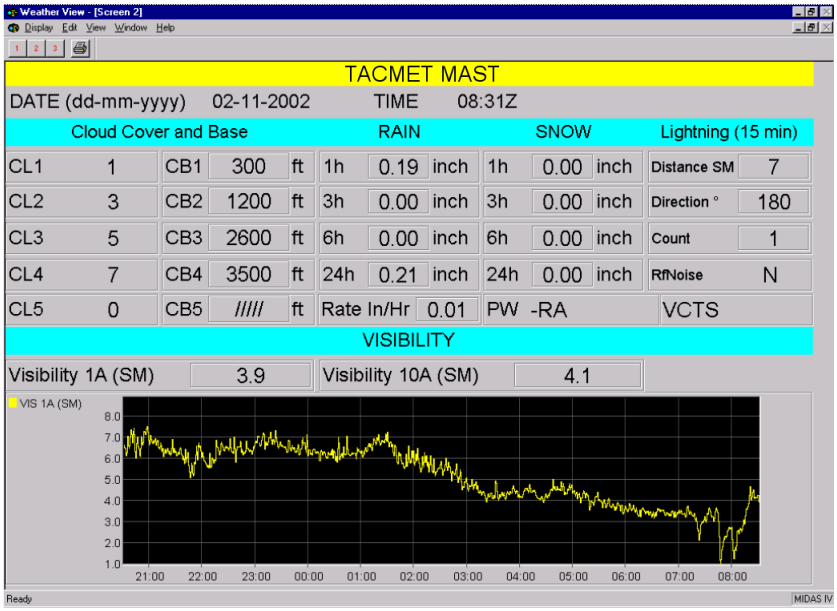


Figure 34 Weather View Screen 2: Enhancement Data

NOTE	If lightning values show slashes (/////), check the cable connections of the SA20M Lightning Detector.

Table 16 Parameters in Enhancement Data Screens

Field	Description
TACMET MAST	Weather station identification
DATE	Current date
TIME	Current time
Cloud Cover and Base	Cloud covers CL1 to CL5 and cloud bases CB1 to CB5.
CL1 ... CL5	CL1 is the lowest cloud base (unit is Octa).
CB1 ... CB5	Height of the cloud base.
RAIN	Precipitation values from PWD11A
1h ... 24h	Last 1 (and 3, 6, 24) -hour precipitation sum
Rate In/Hr	Rain intensity
SNOW	SNOW values from PWD11A
1h ... 24 h	Last 1 (and 3, 6, 24) -hour snow sum
PW	Present weather code (see Table 17 below and Table 18 below)
Lightning (15 min)	Lightning values (last 15 minutes)
Distance SM	Distance to nearest lightning strike
Direction º	Direction to nearest lightning strike
Count	Number of lightning strikes in 15 minutes
RfNoise	SA20M skinmap information: N (None), L (Low), M (Medium), and H (High)
Visibility 1A (SM)	1-minute average visibility values
Visibility 10A (SM)	10-minute average visibility values

Table 17 Present Weather Codes (Qualifiers)

Intensity	Descriptor
Light (-) 1)	BC Patches 1)
Moderate 1) (no qualifier)	SH Showers 1)
Heavy (+)1)	TS Thunderstorm 2)
VC In the vicinity 2)	FZ Freezing 1)

1) Codes from the PWD11A sensor
2) Codes generated by MAWS using data also from other sensors than PWD11A

Table 18 Present Weather Codes (Phenomena)

Precipitation 1)	Obscuration	Other
DZ Drizzle	BR Mist 1)	SQ Squalls 2)
RA Rain	FG Fog 1)	
SN Snow	DU Widespread dust 1)	
IC Ice crystals	HZ Haze or dust 3)	
PL Ice pellets		

1) Codes from the PWD11A sensor
2) Codes generated by MAWS using data also from other sensors than PWD11A
3) Codes generated using PWD11A and MAWS data

If present weather information for a specific group does not exist, this group is omitted.

Example:

-RA: "Light rain"

Follow the instructions in section Changing Graphic Scales on page 65 to change the scales of the visibility diagram.

Screen 3

Screen 3 is a graphic display, which shows pressure, cloud base, and wind speed data.

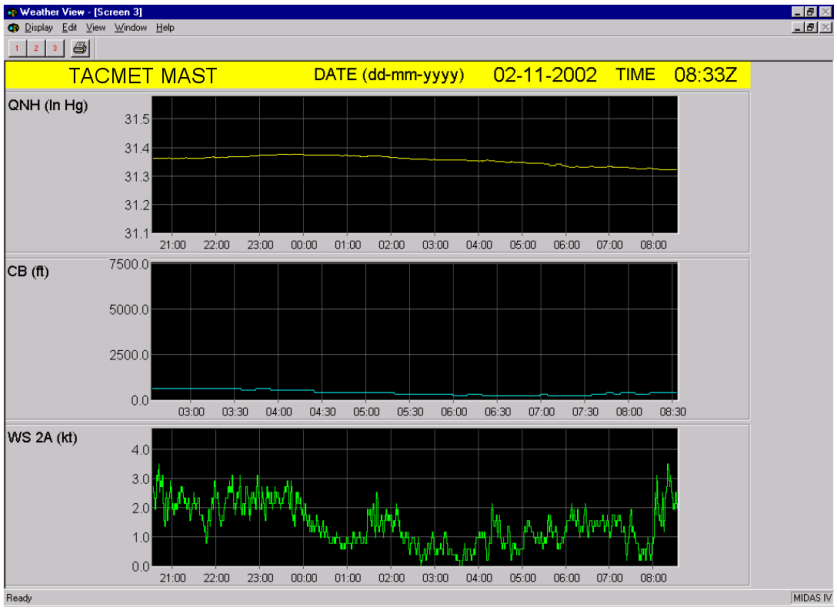


Figure 35 Weather View Screen 3: Graphic Display

Table 19 Parameters in Graphic Display

Field	Description
TACMET MAST	Weather station identification
DATE	Current date
TIME	Current time
QNH	QNH (altimeter setting) graph
CB	Cloud base graph
WS 2A	Wind speed 2-minute average graph

Follow the instructions in section Changing Graphic Scales on page 65 to change the scales of the diagrams.

Changing Graphic Scales

To change the scale of a diagram (for example temperature diagram in screen 1), do the following:

1. Move the cursor over the temperature diagram.
2. Click the right mouse button.
3. Change the scales as desired (see Figure 36 below) and click **OK**.

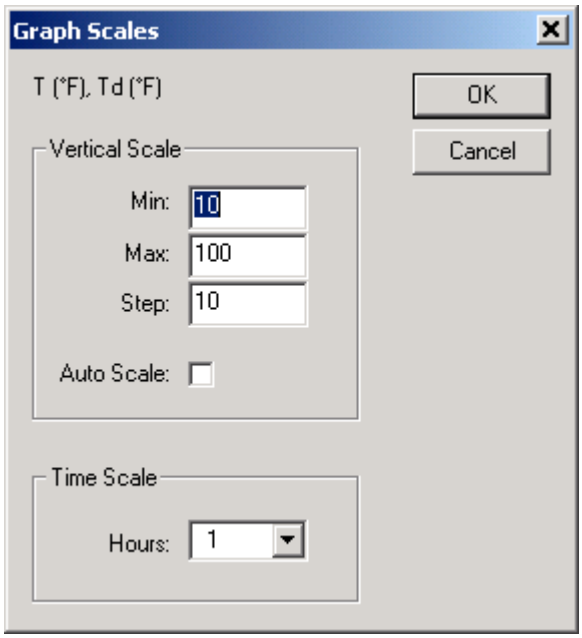
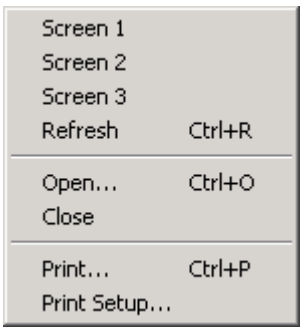


Figure 36 Changing the Scales

Menu Options

The Weather View application contains five menus: Display, Edit, View, Window, and Help.

Display



The Display menu contains the following options:

- **Screen 1 to 3** displays a Weather View screen
- **Refresh** updates all display items
- **Open** displays the screen description files
- **Close** shuts the active window
- **Print** prints the data shown on the active display
- **Print Setup** displays printer and connection options

Edit

The Edit menu contains the following command:

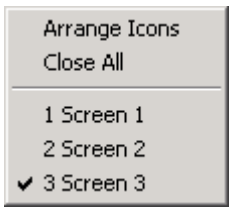
- **Copy As Bitmap** copies the current display to the clipboard as bitmap picture

View

The View menu contains the following commands:

- **Toolbar** shows/hides the toolbar
- **Status Bar** shows/hides the status bar

Window



The Window menu contains the following commands:

- **Arrange Icons** arranges icons of minimized windows
- **Close All** closes all open windows
- **Screen 1 to 3** displays a Weather View screen

Help

The Help menu includes the following command:

- **About Weather View** shows version and copyright information.

Toolbar

The toolbar contains the following shortcut icons for the most frequently used menu options:

= **Screen 1** opens the first Weather View screen (Basic data).

= **Screen 2** opens the second Weather View screen (Enhancement data).

= **Screen 3** opens the third Weather View screen (Graphical view).

= **Print** prints the active document.

Status Bar

The status bar (at the bottom of the screen) displays information on the current state of the application.

METAR/SPECI Template

The METAR/SPECI template (referred to as US METAR template) generates a METAR observation report at the intervals specified in the system configuration. Sensor data is automatically updated onto the template. The observation follows the format specified by WMO. The observations can be edited or augmented by the operator and are not distributed until approved by the operator. Special observations are generated when weather parameters reach the threshold specified in the system configuration and as required by ICAO Annex III. There is also support for corrected and retarded messages.

The template window appears on your screen (see Figure 37 below) when it is time to send a METAR/SPECI report. This window is also displayed when you open the application yourself. The template is similar for both METAR and SPECI reports; the only difference is the **Type** field.

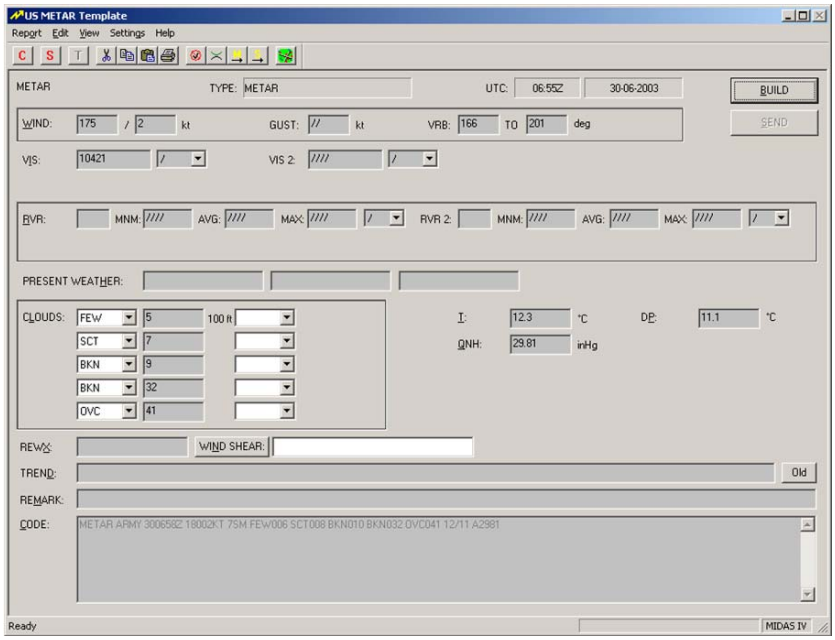


Figure 37 US METAR Template

METAR/SPECI service starts automatically at system startup. When you do not need to use the application, you can minimize the window.

NOTE	The thresholds listed in Table 20 on page 69 are country specific and must be confirmed.

Table 20 Thresholds That Initiate Automatic SPECI Report

Measured Parameter	Threshold
Wind direction	60 deg
Wind speed	5 m/s (9.7 kt)
Gust	5 m/s (9.7 kt)
Air pressure	Changes by 0.3 hPa (0.01 inches Hg) from the previous METAR
Cloud layer	When a cloud layer with an octa of 5 ... 8 (BKN/OVC) goes below 100 ft (30.48m), 200 ft (60.96m), 300 ft (91.44m), 500 ft (152.40m), 700 ft (213.36m), 1000 ft (304.80m), 1500 ft (457.20m), or 3000 ft (914.41m).
Vertical visibility	When the visibility goes below: 100 ft (30.48m), 200 ft (60.96m), 300 ft (91.44m), 500 ft (152.40m), 700 ft (213.36m), 1000 ft (304.80m), or 1500 ft (457.20m).

The buttons in the US METAR template are described in Table 21 below.

Table 21 Buttons in US METAR Template

Button	Description
BUILD	Builds and validates the report
SEND	Saves the report to hard disk, or sends the report to the external interface
WIND SHEAR	Opens the **Wind Shear Data** window for selecting the runways with wind shear
Old	Enters the previous TREND in the **TREND** field

The US METAR template functions can be selected from the menu bar. The typical menus and menu commands are presented in the following tables. Depending on the system configuration, all options may not be available.

Table 22 US METAR: Report Menu

Command	Description
BUILD	Builds and validates the report
TREND	Sends a TREND request to forecaster
SEND	Saves the report to hard disk, or sends the report to the external interface
CORR	Displays a template for a corrected METAR with the data from the previously sent METAR report filled in.
SPECI	Displays a new SPECI template for editing
Print	Prints the template screenshot
Print Preview	Displays the preview of the print
Print Setup	Opens a window for changing the printer and paper settings

Table 23 US METAR: Edit Menu

Command	Description
Undo	Cancels the last action
Cut	Removes the selected text
Copy	Copies the selected text
Paste	Adds the copied or cut text at the cursor location
Copy to Clipboard	Copies the template as a bitmap image to the Clipboard

Table 24 US METAR: View Menu

Command	Description
Toolbar	Shows/hides the toolbar
Status bar	Shows/hides the status bar

Table 25 US METAR: Settings Menu

Command	Description
Automated METAR	Turns the automated METAR function on. The system sends the METAR report without user intervention.
Automated SPECI	Turns the automated SPECI function on. The system sends the SPECI reports without user intervention.
Minimize After Send	Minimizes the template to the task bar after the report has been sent.
No consistency check	Turns the consistency check off. When selected, the system does not display validation error messages when building the report.
Trend field from observer	Defines that observer provides the TREND forecast.
METAR/MET REPORT Manager	Opens the METAR/MET REPORT Manager application.
Select font	Opens a window for changing the font used in data fields.

Table 26 US METAR: Help Menu

Command	Description
About METAR/MET REPORT Template	Displays software version and copyright information

The METAR/MET REPORT toolbar typically contains the buttons described in Table 27 below. Depending on the system configuration, some options may not be available.

Table 27 US METAR: Toolbar Buttons

Button	Name and Description
	CORRECTED displays a template for a corrected METAR with the data from the previously sent METAR filled in.
	SPECI displays a new SPECI template for editing.
	TREND request sends a TREND request to Forecaster.
	Cut removes the selected text.
	Copy copies the selected text.
	Paste adds the copied or cut text at the cursor location.
	Print prints the template.
	No consistency check turns the consistency check off. When selected, the system does not display validation error messages when building the report.
	Trend field from observer, defines that observer provides the TREND report.
	Automated METAR turns the automated METAR function on; the system sends the METAR reports without user intervention.
	Automated SPECI turns the automated SPECI function on; the system sends the SPECI reports without user intervention.
	METAR/MET REPORT Manager opens the application for defining the source of data in the data fields.

METAR/MET REPORT Manager

With the METAR/MET REPORT Manager, you can define the measurement site from which US METAR template data comes. If you choose, for example, **MAWS1**, the data comes automatically from MAWS1 to the US METAR template. If you choose **manual**, you have to add the value manually to the US METAR template.

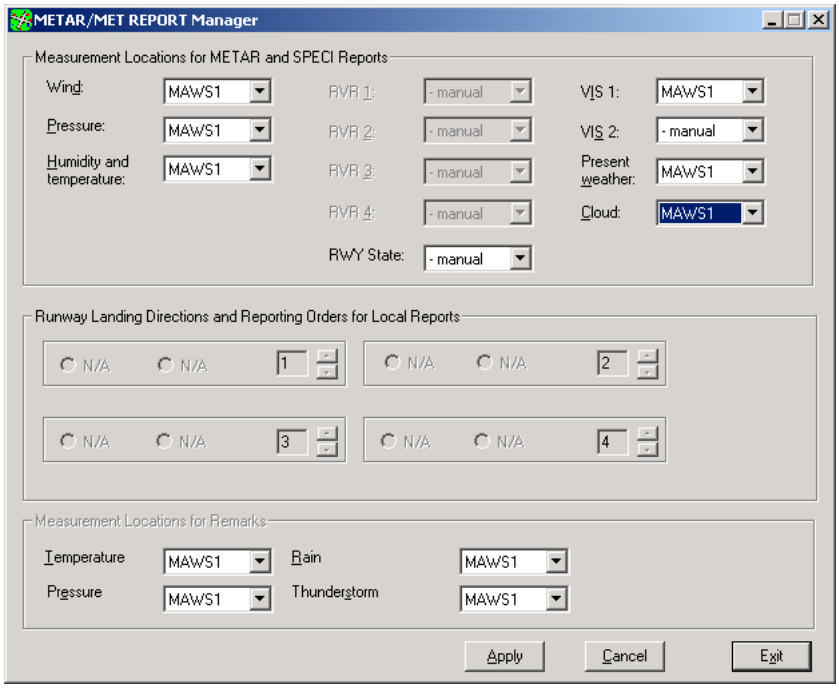


Figure 38 METAR/MET REPORT Manager

METAR/SPECI Editing Procedure

The steps of producing a METAR/SPECI report are:

- Checking and editing data fields
- Adding remarks
- Building the report
- Sending the report.

Checking and Editing Data Fields

When the US METAR template window appears on your screen, several fields are already filled with sensor data. These fields are called automatic data fields, because the system automatically fills them in for you.

The template also includes manual data fields. They are called manual because they are not filled in automatically. You need to fill them in yourself by clicking the field and entering the value. When the template appears, the manual fields have slashes (////) in them or they are empty.

To be able to notice a problem situation in the system, it is important to understand which fields are automatic and which are manual. Table 28 below lists automatic and manual fields and the special conditions related to them.

Table 28 Data Fields in METAR/SPECI Template

Parameter	Automatic/ Manual	Comment
WIND, 1st field	Automatic	Wind direction in degrees.
WIND, 2nd field	Automatic	Wind speed in m/s or knots.
GUST	Automatic	Maximum wind speed during the last 10 minutes.
VRB, 1st field	Automatic	Lower limit of wind direction variation in degrees during the last 10 minutes
VRB, 2nd field	Automatic	Upper limit of wind direction variation in degrees during the last 10 minutes
VIS, value	Automatic	Visibility, 10-minute average from the selected site
VIS, direction code	Manual	Direction of visibility (N, NE, E, SE, S, SW, W, NW, or /)
VIS 2, value	Manual	Visibility, 10-minute average from the selected site
VIS 2, direction code	Manual	Direction of visibility (N, NE, E, SE, S, SW, W, NW, or /)
RVR fields	Manual	Runway Visual Range: minimum, average, maximum, tendency.
RVR 2 fields	Manual	Runway Visual Range: minimum, average, maximum, tendency.
PRESENT WEATHER, 1st field	Automatic	Automatic value from PWD11A.
PRESENT WEATHER, 2nd field	Manual	Second present weather code
PRESENT WEATHER, 3rd field	Manual	Third present weather code
CLOUDS , 1st row, 1st field	SKC and VV automatic, other values manual.	Cloud amount (VV, SKC, FEW, SCT, BKN, OVC).
CLOUDS, 1st row, 2nd field	Automatic	Cloud height in meters, feet, or hundreds of feet.
CLOUDS, 1st row, 3rd field	Manual	Cloud type (CB, TCU)
CLOUDS, all other rows	Manual	Like the fields in the first row of the Clouds group, except the cloud amount options are: FEW, SCT, BKN, OVC. The 1st row is for the lowest cloud layer, the last row for the highest layer.
T	Automatic	Temperature in Celsius degrees.
DP	Automatic	Dew point in Celsius degrees.
QNH	Automatic	Pressure reduced to the mean sea level in hectopascals or inHg.
REWX	Manual	Recent weather code.
WIND SHEAR	Manual	Wind shear alerting system is not a standard part of the system, so this is a manual field.
TREND	Automatic	The field is a special data field.
REMARK	Manual	The field is for additional information.
CODE	Automatic	Shows the data to be sent

NOTE	Slashes in manual fields are normal. When you see slashes in manual fields, enter data in the field.

Adding Remarks

You can add remarks to the METAR report whenever necessary. A remark is any comment you consider important; it could be related, for instance, to runway conditions.

Building the Report

Build the report by clicking the **BUILD** button. The system validates the report. If the system displays error messages, do one of the following:

- If you click **Yes**, the report is built. Some data may be marked with slashes.
- If you click **No**, the system does not continue building the report. You can correct the values in the data fields and click the **BUILD** button again.

When you click the **BUILD** button, the system performs a set of validations, depending on the configuration. The system checks that certain values, for example, temperature, dew point, and pressure fall within the normal range.

The system also checks that present weather codes and numeric data are consistent and that you have entered cloud amount data together with the cloud height data.

If the values are valid, the system builds the report and you can send it. If the system finds invalid values, it informs you about them with error messages.

CAUTION	If the **No consistency check** option in the **Settings** menu is selected, the system will not display the error messages. Instead, it replaces the incorrect values by slashes in the final report code.

The system displays the final report text in the **CODE** field. Check the report code. If there are errors in the code, correct the values in the template data fields and click **BUILD** again.

Sending the Report

When you have built the report and made sure that the text in the **Code** field is OK, you can send the report by clicking the **SEND** button. The system adds the abbreviated header lines automatically in the beginning of the report and sends it. If the **Minimize after send** option is selected from the **Settings** menu, the system automatically minimizes the template window.

ASCII Log View

MIDAS IV stores METAR history files for a period of 30 days. After that, they are automatically erased from the folder. The files are stored on C:\MIDASIV\HISTORY\.

You can open the history files with the ASCII Log View application as follows:

1. Open the **MIDAS IV Tacmet** folder on the desktop.
2. Double-click the **ASCII Log View** icon.
3. To open the history files, select **Open** in the **File** menu, and browse to C:\MIDASIV\HISTORY\. For the history file names, refer to Table 29 on page 76.

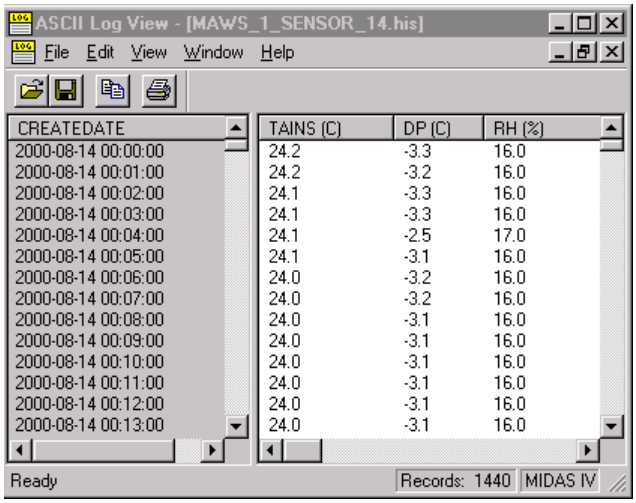


Figure 39 ASCII Log View

Table 29 History File Names and Content

Stored data	File name	Explanation
Weather parameters	x_SENSOR_date	Data from all MAWS x (1 or 2) sensors.
	x_THUNDER_date	Data from SA20M sensors
Events	EVENTS_1.HIS	Data from the 1st day of the month.
METAR/SPECI reports	REPORTS_1.HIS	Data from reports sent in the 1st day of the month.

Table 30 History File Column Indicators

Column	Explanation [unit]
BASE1 ... BASE5	1st ... 5th cloud base [m]
CH1INS	1st cloud height [m]
COUNT15, COUNT60	Lightning count within last 15 or 60 min.
CREATEDATE	Date and time when the data is logged.
DA	Density altitude [m]
DIRNEAREST	Nearest lightning direction [Deg]
DP	Dew point [°C]
OCTA1 ...OCTA5	1st ... 5th octa [Octa]
MOR_10A	10 minute average visibility
MOR_10M	10 minute minimum visibility
MOR_10X	10 minute maximum visibility
PA	Pressure altitude [m]
PAINS	1-minute barometric pressure average [hPa].
PTEND	Pressure tendency [hPa]
PTREND	Pressure trend (3-hour difference) [hPa]
PW1	Metar present weather code 1 by PWD11A
PW2	Metar present weather code 2 by PWD11A
PW3	Metar present weather code 3 by PWD11A
PWTXT	Metar present weather text by PWD11A and SA20M
QFE	Field level pressure [hPa]
QFF	Sea level pressure [hPa]
QNH	Altimeter setting [hPa]
RAIN_SUM1H	1-hour rain sum [mm] by QMR101M
RAIN_SUM3H	3-hour rain sum [mm] by QMR101M
RAIN_SUM6H	6-hour rain sum [mm] by QMR101M
RAIN_SUM24H	24-hour rain sum [mm] by QMR101M
RANGENEAREST	Nearest lightning range [km]
RATE	Precipitation rate
RAW_MESSAGE	SA20M raw message
RH	1-minute relative humidity average [%].
SKINMAP	Electrical interference
SNOW_SUM1H	1-hour snow sum [mm]
SNOW_SUM3H	3-hour snow sum [mm]
SNOW_SUM6H	6-hour snow sum [mm]
SNOW_SUM24H	24-hour snow sum [mm]
TAINS	1-minute temperature average [°C].
THUNDER_REMARK	Metar present weather code by SA20M
VERVIS	Vertical visibility
VISINS	Instant visibility [m]
WATER_SUM1H	1-hour water sum [mm] by PWD11A
WATER_SUM3H	3-hour water sum [mm] by PWD11A

Column	Explanation [unit]
WATER_SUM6H	6-hour water sum [mm] by PWD11A
WATER_SUM24H	24-hour water sum [mm] by PWD11A
WD2A	2-minute wind direction average [Deg]
WD10M	10-minute wind direction minimum [Deg]
WD10A	10-minute wind direction average [Deg]
WD10X	10-minute wind direction maximum [Deg]
WIND_SQUALL	Wind squall
WS2A	2-minute wind speed average [m/s]
WS10A	10-minute wind speed average [m/s]
WS10M	10-minute wind speed minimum [m/s]
WS10X	10-minute wind speed maximum [m/s]
WSGUST	Wind gust

Event Monitor

Event Monitor is an application for viewing and acknowledging events, warnings, and alarms in the system.

Events are divided into three categories: operational, technical, and internal events. Operational events are notifications about changed meteorological conditions. Technical events are related to the functioning of the sensors and to the communication between the sensors and MIDAS IV Computer. Internal Events concern the internal operation of the system, normally the operation of the system services.

The system creates an event when technical or meteorological conditions change.

Double-click the Event Monitor icon on the desktop to open the Event Monitor.

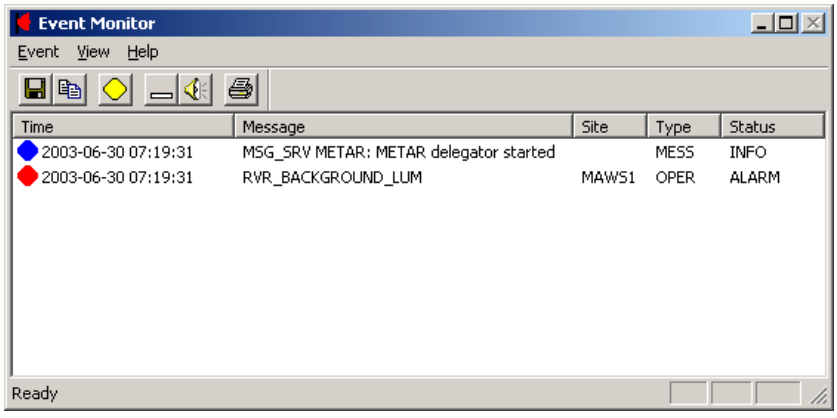
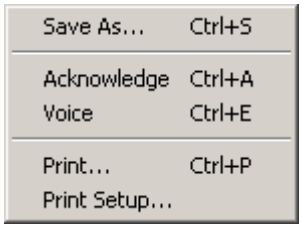


Figure 40 Event Monitor Screen

Menu Options

The Event Monitor application contains three menus: Event, View, and Help.

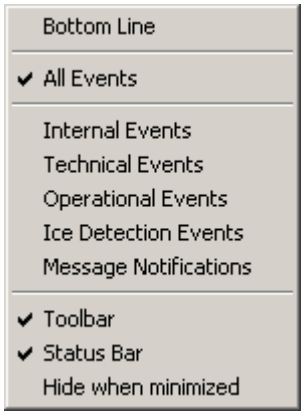
Event



The **Event** menu contains the following options:

- **Save As** saves the Event Monitor screen to a file with a name specified by the user.
- **Acknowledge** marks the active event as noticed.
- **Voice** activates the optional Midas IV voice alarm function. This application is not available with the TACMET system.
- **Print** prints the active window.
- **Print Setup** displays printer and connection options.

View



The **View** menu contains the following options:

- **Bottom Line** minimizes the Event Monitor application into a single line that displays only the first unacknowledged event at the bottom of the screen. Double-click the event line to restore **Full Event Monitor** window.

- **All Events** displays active events, that is, events that have not yet been acknowledged.
- **Internal Events** displays internal events.
- **Technical Events** displays technical events.
- **Operational Events** displays operational events.
- **Ice Detection Events.** This application is not available with the TACMET system.
- **Message Notifications** displays information related to weather reports.
- **Toolbar** shows/hides the toolbar.
- **Status Bar** shows/hides the status bar.
- **Hide when minimized** removes the Event Monitor window button (program icon and name) from the Windows taskbar (on the bottom of the screen) when the window is minimized. The application window can be returned by double-clicking the Event Monitor icon ( ) on the Windows status area (on the right corner of the taskbar).

Help

The Help menu includes the following command:

- **About Event Monitor** shows version and release information.

Toolbar

The toolbar contains the following shortcut icons for the most frequently used menu options:

= **Save** saves the current window to a file.

= **Copy** copies the selected lines to the clipboard.

= **Acknowledge** marks the active event as noticed.

= **Bottom Line** minimizes the application window and displays it at the bottom of the screen.

= **Voice** switches the voice alarm function on or off. This application is not available with the TACMET system.

= **Print** prints the active window.

NOTE It is recommended to leave Event Monitor running whenever you use the system. This is indicated by the **Event Monitor** icon ( ) on the Windows status area.

Display Modes

Normally the Event Monitor application opens in a full-size window. You can also display the application as a single event line on the bottom of the screen by selecting **Bottom Line** from the **View** menu. In the single-line display mode, only the first unacknowledged event is shown. You can restore the **Event Monitor** to a full-size window by double-clicking the **Event Line**.

NOTE Do not use the **Auto hide** option (Windows Taskbar Settings) with the **Bottom Line** command.

When the application is minimized, the window button (program icon and name) is displayed on the Windows taskbar. Additionally, an indicator of current event status is displayed on the status area (on the right corner of the taskbar). The color of the indicator changes depending on the current state of events. Yellow indicates that all events are acknowledged; red color reminds you of unacknowledged events.

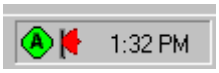


Figure 41 Event Monitor Icon Showing Unacknowledged Events

You can hide the **Event Monitor** window button from the taskbar by selecting **Hide when minimized** from the **View** menu. You can restore the application icon by double-clicking the **Event Monitor** icon on the status area.

Viewing Events

In the **View** menu, you can select different event categories for viewing.

For each message, the following information is displayed:

- Time stamp (Time). The time stamp is updated when the message is acknowledged. The time stamp column also includes an alarm status icon. The color of the icon changes from red to yellow when the event is acknowledged.
- Message text (Message)
- Location of the event (Site)
- Category of the event (Type)
- Status of the event (Status).

Each event can have one of the following statuses:

OVER	=	The event is not currently active. This status never exists in the active event view.
ACKED	=	Operator has acknowledged the event.
ALARM	=	A serious condition exists (for example, one of the sensors is not responding).
WARNING	=	A warning condition exists (for example, one of the sensors requires service).
INFO	=	Connection to event server is not correctly established. The alarm monitor locally generates this alarm.

Acknowledging Events

You can acknowledge the first unacknowledged event with the toolbar icon or by selecting the **Acknowledge** option from the **Event** menu.

When you acknowledge an event, the icon of that event changes from red to yellow. When all events are acknowledged, the **Event Monitor** icon on the taskbar changes from red to yellow.

Checking New Events

To check new events, do the following:

1. In the Windows status area, double-click the **Event Monitor** icon (). The **Event Monitor** window opens.
2. In the **View** menu, select the event types you want to see.
3. Check the latest unacknowledged event in the list (the topmost with red icon).
4. When you have checked the latest unacknowledged event, click the icon. The event is now acknowledged.
5. Minimize the application window. You can also use the **Bottom Line** command to minimize the window to a line showing the latest event. Double-click the event line to restore the full application window.

Event Messages

The event messages are explained in Table 31 below.

Table 31 Event Messages

Event Message	Explanation
1_MAWS_SENSOR_MISSING_DATA	The system has received no PTU data (Pressure Sensor PMT16A or Air Temperature and Relative Humidity Sensor QMH101M) within a specified time.
1_RAIN_SENSOR_MISSING_DATA	The system has received no data from Rain Gauge QMR101M within a specified time.
1_SA20_METAR DATA MISSING	Lightning Detector SA20M cannot provide all the needed data for METAR.
1_TB_SENSOR_MISSING_DATA	The system has received no data from Lightning Detector SA20M within a specified time.
CEILO DATA MISSING	The system has received no data from Ceilometer CT25KAM within a specified time.
FD_MISSING_DATA	The system has received no data from Visibility and Present Weather Sensor PWD11A within a specified time.
MOR_LEVEL_DOWN	MOR = Meteorological Optical Range = visibility. The system reports you between which SPECI limit values the 10-minute average is changing. Limits used are 0 ... 800, 800 ... 1500, 1500 ... 3000, 3000 ... 5000, and 5000 ... 8000.
MOR_LEVEL_UP	
MSG_SRV METAR: METAR delegator started	MSG_SRV service is ready to handle METAR requests.
MSG_SRV METAR: SENT TO AFTN	METAR report was sent to the output line.
MSG_SRV SPECI: Observer Triggered	SPECI report was triggered by the observer.
MSG_SRV SPECI: Temperature changing	Temperature has risen 2 °C or more compared to the last sent METAR. MIDAS IV METAR service notices the temperature difference and proposes SPECI.
OBJECT INFORMATION CONFLICT DETECTED BY SERVER A	The system has detected an incorrect number of ROA objects. One of the following has occurred: 1) A service is not running. 2) End user has closed an obligatory application. 3) METAR/SPECI template has not been opened.
RVR_BACKGROUND_LUM	To be ignored.
WAD DATA MISSING	The system has received no data from Wind Sensor WS425 within a specified time.
WIND SPEED -999.0	Instant wind speed data missing.
WIND DIRECTION -999	Instant wind direction data missing.

Diagnostics Monitor

The Diagnostic Monitor (ROA Diagnostics) application is a tool for monitoring the status of the MIDAS IV system. In Diagnostic Monitor, you can view the status of a CDU (Central Data Unit), ROA (Remote Object Architecture) objects and ROA users. You can also check the location of a sensor.

When you get an Internal Event message in Event Monitor, there may be a problem with the CDU. In such a situation, you need to use Diagnostic Monitor to view the system status more closely. When there is a Technical Event message in Event Monitor, you need to use Diagnostic Monitor to look up the location of the sensor causing the event.

CAUTION Diagnostic Monitor is also an installation tool used by Vaisala personnel. For this reason, it contains some functions you must not use. Incorrect use of these functions can result in serious system problems.
This manual includes instructions only for those functions that you can safely use in your troubleshooting tasks. Do not use functions that are not covered in this manual.

When starting troubleshooting with Diagnostic Monitor, you need to connect to the system in question.

1. Select **System - Connect**.
2. The Connect window appears.
3. Select the CDU (for example MIDAS IV TACMET) and click **OK**.
4. The Statuses tab appears.

Statuses Tab

Figure 42 below shows the Diagnostic Monitor main window/Statuses tab for a duplicated system.

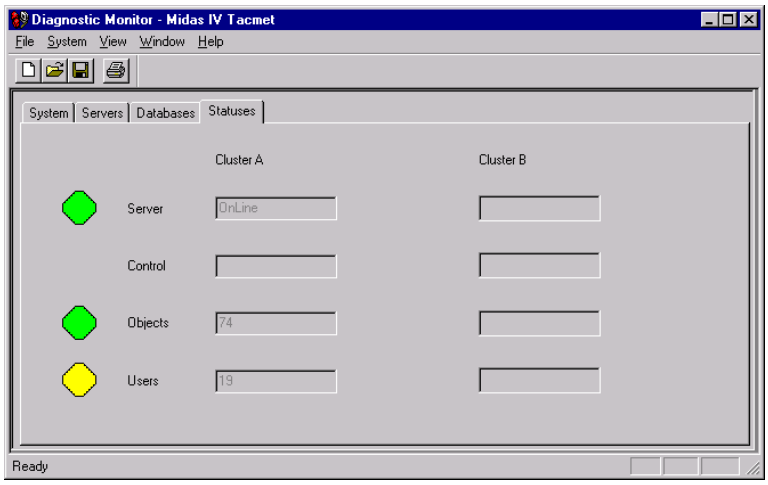


Figure 42 Diagnostic Monitor Statuses Tab

The **Statuses** tab is the most important tab for troubleshooting tasks.

NOTE	The System, Servers, and Database tabs are mainly intended for Vaisala internal use.

In single-CDU systems, the Cluster B column in the **Statuses** tab is not used. Cluster A column shows when the CDU is working properly (**OnLine**) and when it is out of order (**Missing**).

In a single-CDU system, the Statuses tab includes three icons:

Server = Shows the status of the primary CDU.
Objects = Shows the status of ROA data objects in the system.
Users = Shows the status of ROA users in the system.

The color of the Server icon indicates the status of a CDU.

- Green color indicates that the CDU is running correctly.
- Red and yellow colors indicate problems in physical connections, network configuration, or ROA core services.

ROA Object

A ROA object is a runtime data container used by the remote object architecture. The data set it contains can be one of the following:

- Measured weather parameter values produced by a sensor
- Calculated values produced by meteorological services
- Alarm messages produced by the Alarm Service
- Weather report data.

The status of ROA objects in your system is indicated in the **Statuses** tab by the color of the **Objects** icon. In a normal situation, the **Objects** icon is green. If it is red or yellow, you need to open the **Objects** window by selecting **View - Objects**. In the **Objects** window, you can see the name, status, and value of the problem object and open a data item window for it.

Figure 43 below shows the **Objects** window. The window is similar for all system types. You can display the **Objects** window by selecting **Objects** from the **View** menu.

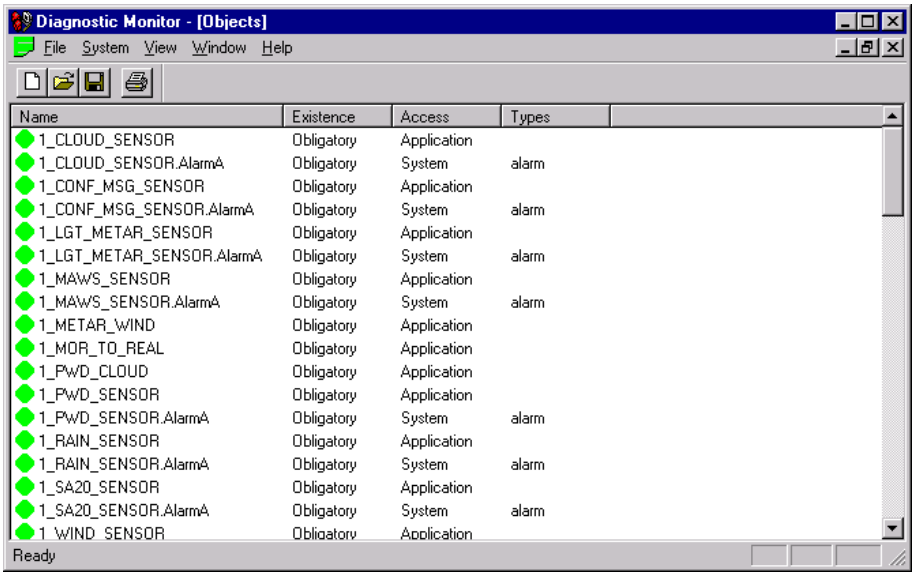


Figure 43 Objects Window in Diagnostic Monitor

The columns in Figure 43 on page 86 are explained below:

Name = The Name column shows the ROA object name. By double-clicking the name (of objects having **Access** type **Application**), you can open a data item window for this object and view data items belonging to it.

Existence = In the **Existence** column, the system shows the status of the ROA object in question. In single-CDU systems, the normal status is **Obligatory**.
In error situations, the status can be either **Missing** or **Unknown**. A **Missing** status is also shown by the red object status icon.
When the existence of a ROA object is **Missing**, the system sends an Internal message **Object information conflict** to Event Monitor. A **Missing** object status means that the object is not running properly in the system or, in rare situations, that the object is missing from the system altogether.
If the existence of a ROA object is **Unknown** (yellow), it usually means that there is an application running for which you do not have a proper license. See also Table 32 below.

Access = Objects are divided into two groups by their access type: **Application** and **System**. If an object has the access type **Application**, you can open a data item window for that object by double-clicking its name. Objects with the access type **System** are internal system objects, and you cannot open a data item window for them; they are only intended for system internal use.

Types = The **Types** column contains programming information intended for Vaisala internal use.

Table 32 Existence Column in Objects Window

Existence	Explanation
Obligatory (green icon)	A system program running in the CDU.
Unknown (yellow icon)	An unlicensed application. Close the application and contact Vaisala for more licenses if necessary.
Missing (red icon)	The object is missing. You may need to reboot the system.

The object status icon is in the leftmost column. This icon shows the status of the ROA object. The icon can be green, red, or yellow. The green icon indicates normal status.

Red and yellow colors indicate missing objects, license violations, or other irregularities related to ROA objects. When the Objects icon is red or yellow, you need to view further object details in the data item window related to each object.

Table 33 below explains the meaning of the status icon colors in the Objects window and gives troubleshooting instructions.

Table 33 Color of Object Status Icon Explained

Color of Object Status Icon	Explanation	Action
Green	Object is running correctly.	No action needed.
Yellow	There is a non-configured program running in the system (usually a Vaisala internal tool).	Stop the non-configured program in Windows Control Panel.
Red	An object is missing, or a non-licensed application is running in the system.	Restart the missing object in Windows Control Panel, or close the non-licensed application in the program and contact Vaisala for more licenses if necessary.

Data Item Window

Figure 44 on page 89 shows the data item window. You can display the data item window by double-clicking the icon of an object in the **Objects** window. The data item window can be displayed for objects that have **Application** access type.

The following figure shows the data item window for ROA object 1_PWD_SENSOR.

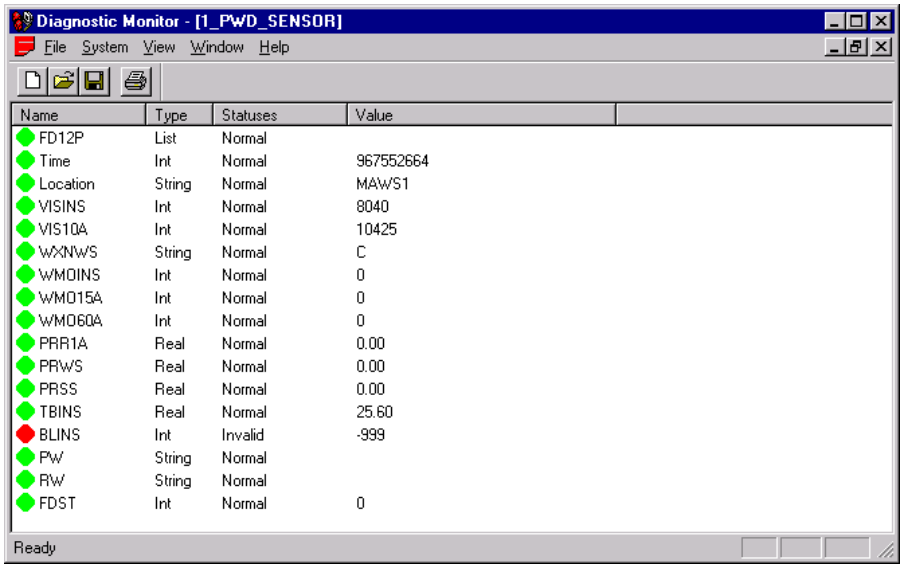


Figure 44 Data Item Window for PWD11A

The columns in Figure 44 above are explained below:

Name = The **Name** column shows the data item name. One ROA object includes several data items.
The data item named **Location** shows the location code of the object.

Type = The **Type** column contains programming information intended for Vaisala internal use.

Statuses = The **Statuses** column is important for ensuring the quality of data in the system and in end-user applications.
The information in the **Statuses** column is updated several times a minute. When the connection between a sensor and the CDU is broken, the information is no longer updated, and the status changes to **Old** and finally **Missing**. If the line is working properly, but the value measured by the sensor is out of the defined validity range, the status is **Invalid**. These statuses correspond with the ones used in end user applications, for example Weather View.

Value = The **Value** column shows the data item value.

ROA User

A ROA user is a program running in the MIDAS IV system. The term "user" should be understood from the system's point of view: ROA users are applications and programs that are using the CDU's services.

NOTE	In this context, the word **user** does not refer to the end user of MIDAS IV workstation.

A ROA user is one of the following:

- Workstation application (for example Weather View, METAR/SPECI)
- System program.

The status of ROA users in your system is indicated in the **Statuses** tab by the color of the **Users** icon. In a normal situation, the **Users** icon is green. If it is red or yellow, you need to open the **Users** window by selecting **View - Users**. In the **Users** window, you can see the name, address, port, and status of the problem ROA user.

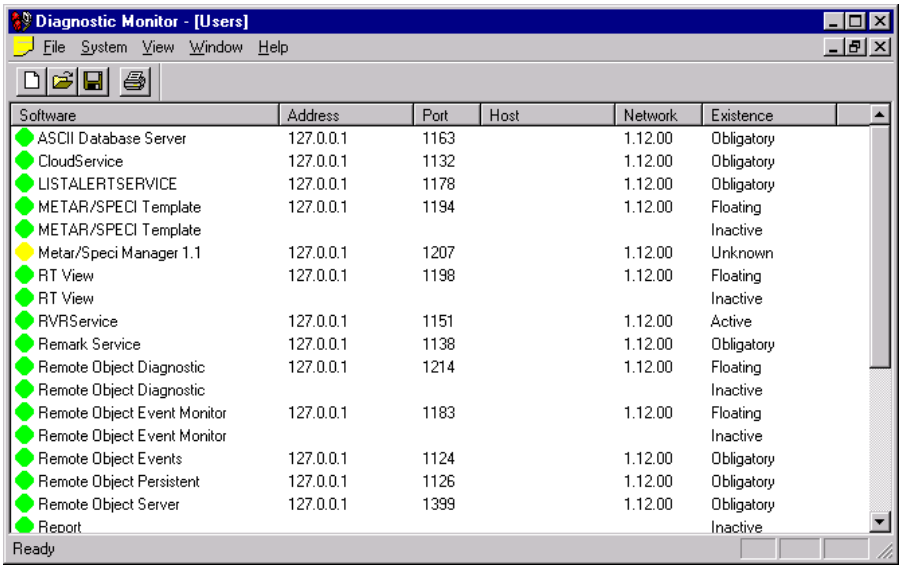

Diagnostic Monitor - [Users]
File System View Window Help
Software | Address | Port | Host | Network | Existence
ASCII Database Server | 127.0.0.1 | 1163 | | 1.12.00 | Obligatory
CloudService | 127.0.0.1 | 1132 | | 1.12.00 | Obligatory
LISTALERTSERVICE | 127.0.0.1 | 1178 | | 1.12.00 | Obligatory
METAR/SPECI Template | 127.0.0.1 | 1194 | | 1.12.00 | Floating
METAR/SPECI Template | | | | | Inactive
Metar/Speci Manager 1.1 | 127.0.0.1 | 1207 | | 1.12.00 | Unknown
RT View | 127.0.0.1 | 1198 | | 1.12.00 | Floating
RT View | | | | | Inactive
RVRService | 127.0.0.1 | 1151 | | 1.12.00 | Active
Remark Service | 127.0.0.1 | 1138 | | 1.12.00 | Obligatory
Remote Object Diagnostic | 127.0.0.1 | 1214 | | 1.12.00 | Floating
Remote Object Diagnostic | | | | | Inactive
Remote Object Event Monitor | 127.0.0.1 | 1183 | | 1.12.00 | Floating
Remote Object Event Monitor | | | | | Inactive
Remote Object Events | 127.0.0.1 | 1124 | | 1.12.00 | Obligatory
Remote Object Persistent | 127.0.0.1 | 1126 | | 1.12.00 | Obligatory
Remote Object Server | 127.0.0.1 | 1399 | | 1.12.00 | Obligatory
Report | | | | | Inactive
Ready

Figure 45 Users Window in Diagnostic Monitor

The columns in Figure 45 on page 90 are explained below:

Software = The **Software** column shows the name of the ROA user.

Address = The **Address** column shows the IP address of the computer running the software in question.

Port = The **Port** column shows the TCP/IP port of the computer running the software in question.

Host = The **Host** column contains information intended for Vaisala internal use.

Network = The **Network** column shows the version number of the ROA network library used in the application. The version number consists of three groups separated by a dot (for example 1.43.03). The first two groups should be the same for each ROA user. If they are not, an old version of the ROA user in question is running in the system.

Existence = The **Existence** column shows the status of the ROA user. A ROA user can be **Obligatory**, **Violation/Unknown**, or **Missing**.
The normal status is **Obligatory**. If the system cannot find a ROA user, the status turns **Missing**. This means that a system program has stopped running, or that an end user has inadvertently closed an application that needs to be constantly open in a workstation (METAR/SPECI).
If the ROA user status is **Violation/Unknown**, it means that there is a non-licensed or non-configured ROA user running in the system.
You might also see the statuses **Floating** and **Inactive** in the Existence column. These statuses are mainly intended for Vaisala internal use.

SensorIO Monitor

SensorIO Monitor is a remote maintenance application. It is used for monitoring the communication port, the field devices, and the field device network communication.

SensorIO Monitor contains two windows: the **Sensor Status Monitor** window for showing the status of field devices, and the **Event Log** window for monitoring the communication from field devices.

CAUTION SensorIO Monitor is also an installation tool used by Vaisala personnel. For this reason, it contains some functions you must not use. Incorrect use of these functions can result in serious system problems.
This manual includes instructions only for the functions that you can safely use in your troubleshooting tasks. Do not use functions that are not covered in this manual.

You can hide and show the toolbar and status bar by selecting the corresponding **View** menu options. Toolbar and status bar are shown on the screen by default.

Sensor Status Monitor Window

In SensorIO Monitor, you can monitor the status of sensor communication in the **Sensor Status Monitor** window.

The window shown in Figure 46 on page 93 appears by default when you open the SensorIO Monitor application. You can also display it by selecting **View - Status View**.

The **Sensor Status Monitor** window shows a list of all sensors configured in your MIDAS IV system.

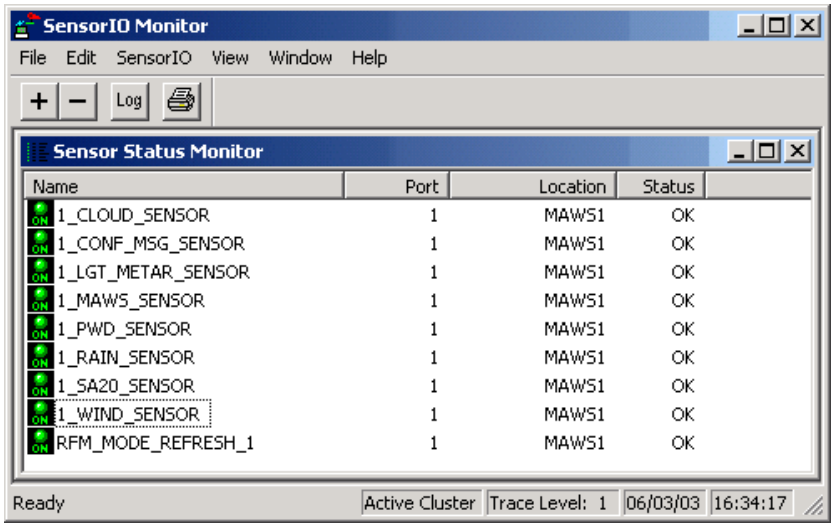


Figure 46 Sensor Status Monitor Window

The columns in Figure 46 above are explained below:

Icon = The connection status icon is the leftmost column on the window. The LED icons in the column display the status of each field device configured in the system. The status information is updated several times a minute. See Table 34 below for details.

Port = The Port column shows the number of the port to which the sensor is connected.

Status = The Status column shows the sensor status. See Table 35 on page 94 for details.

The colors and text in the connection status icon are explained in Table 34 below.

Table 34 Explanation of Connection Status Icon

Icon color and text	Explanation
Green ON	Normal situation. Connection OK.
Yellow	Active connection.
Yellow TMIT	A lengthy data transfer is on the process.
Red ER	Problems in communication between sensors and CDU.
Gray OFF	Sensor is not in use.
Blue CMD	Sensor is in maintenance mode.

Table 35 on page 94 explains the different statuses.

Table 35 Explanation of Status Column

Status	Explanation
OK	Communication between sensors and CDU is running correctly.
Error	Problems in communication between sensors and CDU.
Command Mode	Sensor is in maintenance mode.

When you right-click a sensor name, you can view more information on the sensor by selecting **Sensor Details** from the context menu. The **Field Device Status** window appears, see Figure 47 below.

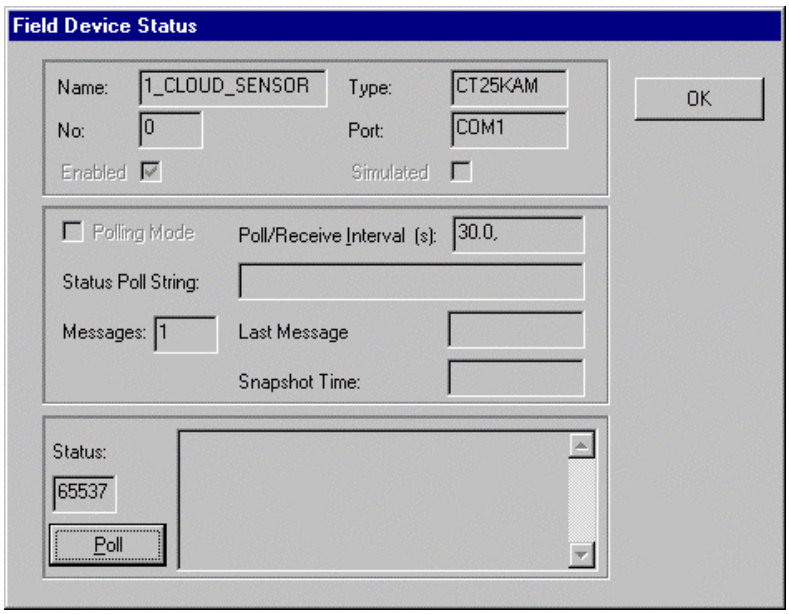


Figure 47 Sensor Details in Field Device Status Window

Event Log Window

The Event Log window contains detailed information on sensor communications. It displays the latest sensor events received from the system.

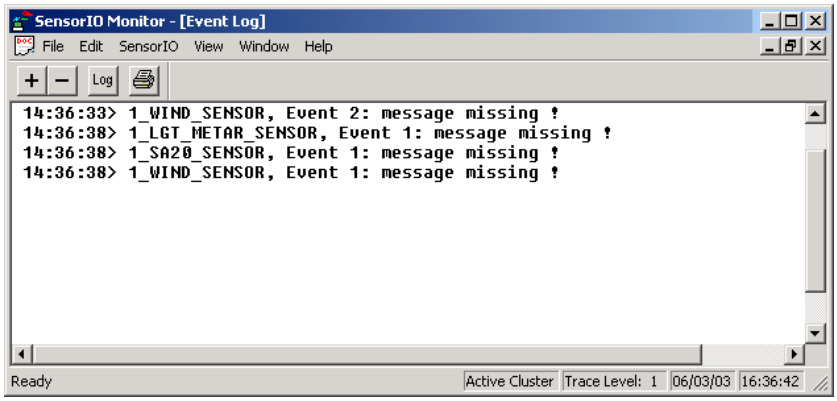

SensorIO Monitor - [Event Log]
File Edit SensorIO View Window Help
Log
14:36:33> 1_WIND_SENSOR, Event 2: message missing !
14:36:38> 1_LGT_METAR_SENSOR, Event 1: message missing !
14:36:38> 1_SA20_SENSOR, Event 1: message missing !
14:36:38> 1_WIND_SENSOR, Event 1: message missing !
Ready
Active Cluster
Trace Level: 1
06/03/03
16:36:42

Figure 48 Event Log Window

The **Event Log** window shows the time of the event, the name of the sensor, the event number, and the sensor message text (for example "message missing!").

You can adjust the amount of details displayed in the **Event Log** window with the **Trace Level** buttons. The higher the trace level is, the more details are shown in the **Event Log**. You can select a trace level from two to nine.

When you click the **Toggle Logging** icon on the toolbar, the contents of the event log are stored in a log file on your hard disk.

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CHAPTER 4

MAINTENANCE

This chapter provides information that is needed in the basic maintenance of the product.

Under normal conditions, MAWS201MP Weather Station needs only a minimum amount of maintenance. In general, it is not advisable to repair sensors in the field.

Tilting the Mast

The MAWS201MP mast is easy to tilt for maintenance purposes.

Figure 49 MAWS201MP Mast Tilted

WARNING	For safety reasons, do not tilt the mast when wind speed is over 7 m/s (14 kt).

WARNING	See that there are no power lines or other obstacles near the mast.

WARNING	Be sure that there are no persons under the mast when the mast is tilted.

WARNING	Avoid touching the wire with bare hands. Do not try to guide the wire.

CAUTION	Be careful not to damage the sensors when tilting the mast.

Follow the procedure below to tilt the mast.

1. Open the shackle to disconnect the guy wire 1 (circled in Figure 50 on page 99) that is on the opposite side to the tilting direction.

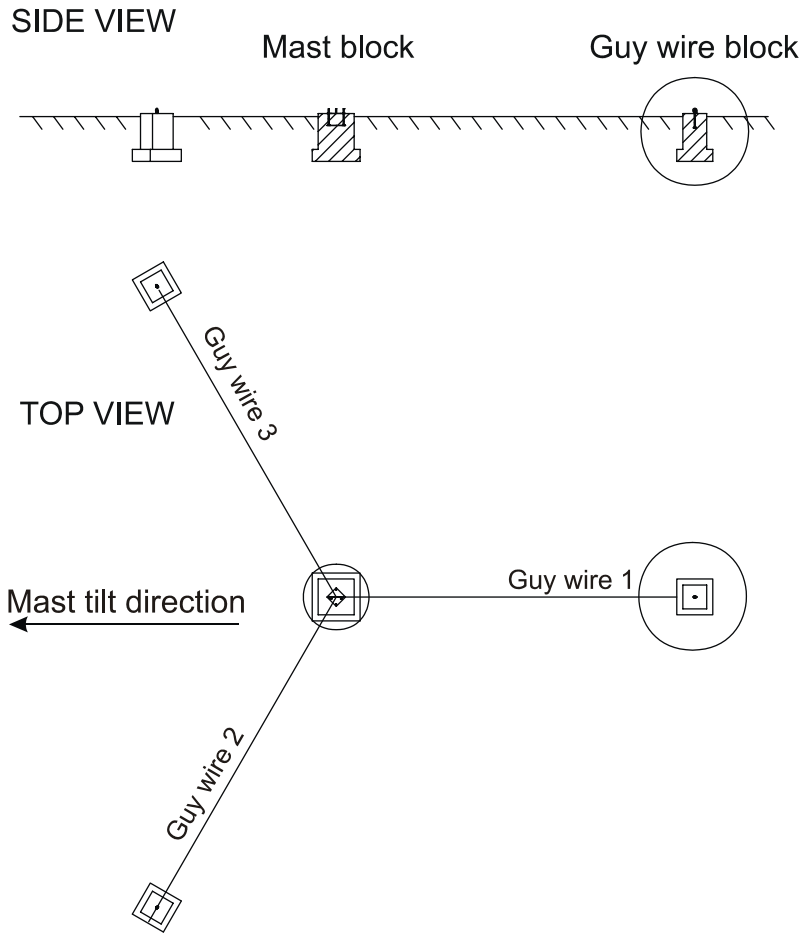

Figure 50 Mast Orientation

2. Open the 4 securing bolts in the hinge (see Figure 51 on page 100).

CAUTION	Do not open the horizontal hinge bolt.

After erecting the mast, secure the hinge with the provided accessories as illustrated in Figure 51 on page 100.

NOTE	Always assemble the washers under the spring washers to prevent the paint from being damaged.

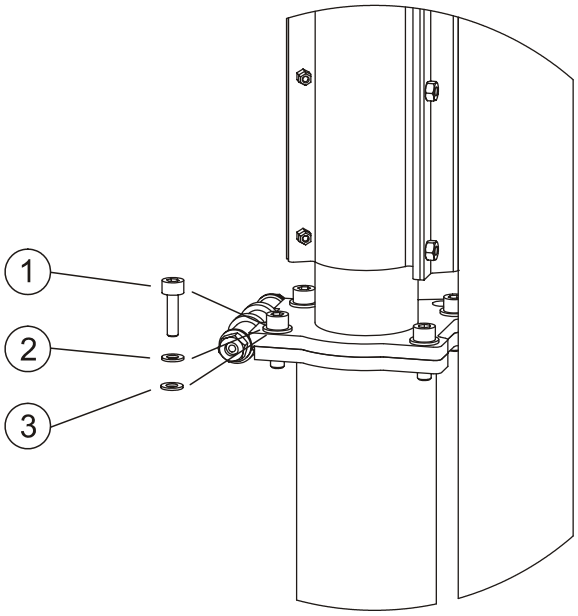

Figure 51 Bolts and Washers for Securing the Hinge

The following numbers refer to Figure 51 above:

1 = Allen bolt
2 = Spring washer
3 = Washer

3. Lower the mast slowly by turning the winch counter-clockwise.

CAUTION	You should always have a good grip on the handle.

4. Install the tilting support to the end of the mast (see Figure 52 on page 101).
5. Lower the mast slowly with the winch so that the mast finally rests on the tilting support.

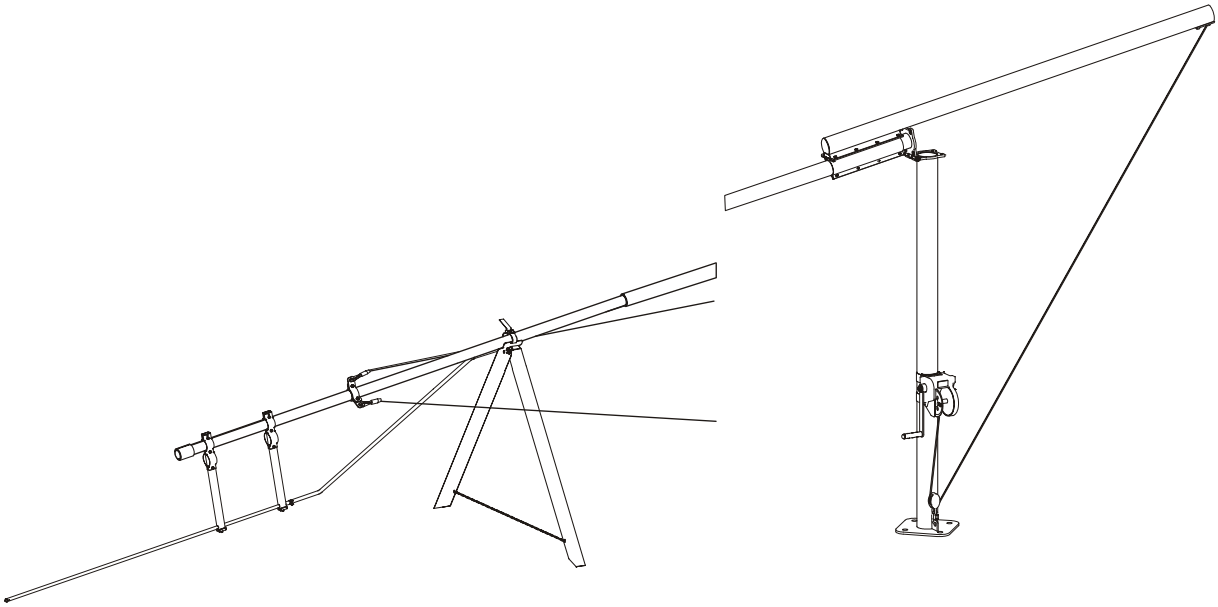

Figure 52 Tilted Mast with Tilting Support

Follow the procedure below to erect the mast:

1. Turn the winch handle clockwise so that the mast does not rest on the tilting support.

CAUTION	Be careful not to damage sensors or accessories with the tilting support.

2. Remove the tilting support.
3. Fully erect the mast with the winch.
4. Screw back the 4 securing bolts in the hinge (see Figure 51 on page 100).
5. Connect the guy wire.

The maintenance of the following sensors and accessories should be carried out when the mast is tilted:

- Ultrasonic Wind Sensor WS425
- Present Weather Detector PWD11A
- Lightning Detector SA20M
- Obstruction Light
- Antenna

Ultrasonic Wind Sensor WS425

Ultrasonic Wind Sensor requires a minimum amount of maintenance. If the sensor fails, replace it with a known good unit.

Present Weather Detector PWD11A

PWD11A is designed to operate continuously for several years without maintenance other than cleaning of the lenses and the DRD sensing surface (see Figure 53 below). No initial calibration of PWD11A is needed, because the sensor has been calibrated at the factory. Periodic maintenance of the PWD11A Present Weather Detector includes:

- Cleaning of the transmitter and receiver lenses and hoods
- Cleaning of the DRD Rain Detector.

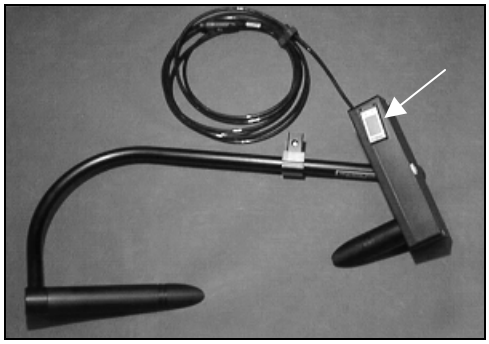

Figure 53 Present Weather Detector (Arrow Pointing to DRD)

NOTE	Some erroneous data may be generated due to cleaning the sensor.

Cleaning Transmitter and Receiver Lenses and Hoods

The lenses of the PWD11A transmitter and receiver units should be relatively clean to get reliable results. With dirty lenses, the shown visibility values are not reliable. Cleaning should be done every six months or more often depending on the conditions (for example, if there are roads nearby, more cleaning will be necessary).

1. Clean the lenses with a lens-cleaning wipe. Be careful not to scratch the lens surfaces. Lenses should dry up indicating that the lens heating is functioning.
2. Check that the hoods and lenses are free of condensed water or ice and snow deposits.
3. Wipe the dust from the inner and outer surfaces of the hoods.

Cleaning DRD Rain Detector

The capacitive rain detector DRD should be cleaned every six months or more often depending on the conditions.

CAUTION	The measuring principle does not allow for proper ESD protection of the DRD electronics, carefully follow the instructions below.

1. Ground your hand by touching grounded metallic parts of the installation to remove excessive static charges from your body.
2. Clean the DRD rain detector carefully with a soft, lint-free cloth moistened with mild detergent. Be careful not to scratch the surface.
3. Check that the detector is free of ice and snow deposits.

Storage

Store PWD11A in its transit case in dry conditions, not in the open air. Storage conditions are:

- Temperature -40 to 70 °C (-40 to 158 °F)
- Relative humidity up to 95 %

Lightning Detector SA20M

There are no customer serviceable components in SA20M. If the sensor fails, replace it with a known good unit.

Obstruction Light

If the obstruction light gets dirty, clean it with water and mild soap only. If the obstruction light fails, replace the whole unit.

Antenna

Antennas require a minimum amount of maintenance. Field repairs are accomplished by changing the complete antenna.

Temperature and Relative Humidity Probe QMH101M

Calibration and maintenance of the air temperature and relative humidity probe should be performed at regular intervals, depending on the conditions of use and desired accuracy. The validity of the readings should be checked annually.

Replacing QMH101M Probe

To replace the QMH101M probe with a calibrated probe, perform the following steps:

1. Disconnect the Temp/Humidity cable (red-coded) from the TACMET MAWS.
2. Remove the sensor from the radiation shield by pulling gently.
3. After the sensor is detached from the radiation shield, pull the probe head out of the handle (see Figure 54 on page 105).

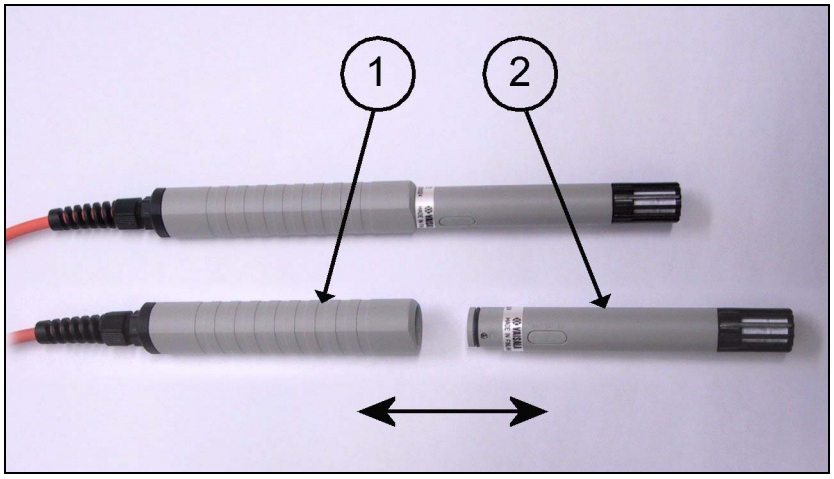

Figure 54 QMH101 Probe Maintenance

The following numbers refer to Figure 54 above.

1 = Handle with cable
2 = Probe head

4. Attach the calibrated probe into the handle.
5. Push the sensor carefully back into the radiation shield.
6. Reconnect the cable.

Rain Gauge QMR101M

To ensure reliable and accurate measurements, we recommend that the following checks be carried out at each visit to the rain gauge.

NOTE	If the gauge is still connected to the data logger and logger is operating, be careful not to tip the spoon/bucket when carrying out the following operations.

1. Inspect the funnel for any damage or blockage. At certain times of year, leaves may have accumulated into the funnel. Dirt and dust can also block the grille preventing or reducing the flow rate to a slow drip to the buckets beneath. Remove all obstacles from the funnel.
2. Check that the gauge is still level. It is surprisingly easy for an apparently immovable gauge to become tilted as a result of

small ground movements, vandalism, or just an inquisitive finger.

3. Clean the spoon from dust and dirt once or twice a year to ensure precise measuring.

Pressure Sensor PMT16A

PMT16A requires no maintenance.

Calibration

The TACMET MAWS software provides a means for one-point calibration of Pressure Sensor PMT16A.

Required equipment:

- Laptop PC with a terminal software (for example, HyperTerminal)
- Reference pressure sensor
- TACMET MAWS PC cable ZZ45202

Calibration procedure of PMT16A is the following:

1. Place the reference pressure sensor at the same level with PMT16A (located inside the tripod enclosure).

NOTE	Make sure the wind does not interfere with the reading of the reference barometer.

2. Connect the MIDAS IV PC to TACMET MAWS with the ZZ45202 cable.
3. If the MIDAS IV software is running shut it down using TACMET Wizard.
4. Establish terminal connection to TACMET MAWS by launching the terminal software. The correct communication parameters are:
   - 4800 bps
   - 8 data bits
   - 1 stop bit
   - No parity
   - No handshaking

5. When data messages appear in the terminal software, type **open** and press ENTER.
6. Read the reference barometer reading.
7. Give the reference reading to TACMET MAWS. Type **PMT16CAL 1003.7** (where 1003.7 hPa is the reference reading) and press ENTER.
8. Check the readings given by TACMET MAWS:
   - Value = reference reading
   - Measured value = measured by TACMET MAWS
   - Offset = measured value - reference reading
9. Wait for a couple of minutes.
10. Check the pressure reading with the handheld terminal. It should be the same as the reference reading.
11. Repeat the calibration, if necessary.
12. Type **close** and press ENTER to close the terminal connection.
13. Shut down the terminal software.
14. Restart MIDAS IV using TACMET Wizard.

Ceilometer CT25KAM

Periodic maintenance is normally limited to window cleaning. In addition, alarms should be checked regularly with the handheld terminal.

CAUTION	Ceilometer should never be opened by unauthorized personnel. Opening it will void the warranty.

Window Cleaning

The ceilometer lens and window should always be free of any dirt or particles during operation. Data messages include a warning if the window is contaminated.

After the system has detected contamination, it starts the blower, which removes contamination.

In case of the "Optics Contamin" alarm (see Table 10 on page 51) the window has to be cleaned.

To clean the window:

1. Flush the window with water to remove coarse grains.
2. Clean the window with a lens-cleaning wipe.

CAUTION	Particles between the towel and the window may damage the anti-reflection coating. Therefore, instead of circular rubbing, the window should be wiped once across the window. If additional wiping is needed, a clean part of the towel should be used.

Storage

Place caps on all external connectors if stored unpacked for extended periods of time in an unconditioned area. Also, maintain a dust cover on the window during long periods of storage.

Logger Enclosure QME101M

Logger tube QME101M requires a minimal amount of maintenance. Field repairs are accomplished by replacing the complete module.

Power Supply and Connection Unit QMP202MP

QMP202MP requires a minimal amount of maintenance. Field repairs are accomplished by replacing the complete module. The expected battery life expectancy is 4 to 5 years.

Mains Power Supply QMP211

QMP211 requires a minimal amount of maintenance. Field repairs are accomplished by changing the complete module.

NOTE	Do not open the mains power supply unit.

Communication Accessory Enclosure QCA101

QCA101 requires a minimal amount of maintenance. Repairs are accomplished by replacing the complete module.

Handheld Terminal QMD101M

Under normal conditions, QMD101M needs only a minimal amount of maintenance. In general, it is not advisable to repair QMD101M in the field. Field preventive maintenance is limited to cleaning the display periodically, if necessary. Field repairs are accomplished by changing the complete terminal.

Cable Maintenance

Inspect cables for breaks, cracks in the protective coating or cable connectors, and bent, damaged, or misaligned pins. Also wipe off or remove excess dirt, dust, sand, and leaves.

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CHAPTER 5
TROUBLESHOOTING

This chapter consists of some common problems, their probable causes, and remedies.

Software Operation

Table 36 Some Common Problems and Their Remedies.

Problem	Probable Cause	Remedy
TACMET MAWS will not open for commands.	The terminal connection is not open.	Check the cable connection.
	MAWS is not receiving power.	Check connections and power supply.
MAWS is not sending anything (nothing is seen on the handheld terminal or PC screen).		Reset MAWS.
MIDAS IV shows slashes (/////) instead of measured values.	Cable connection problem.	Check the cable connections and the condition of the cables (see section Cable Maintenance on page 109).

CT25KAM

Warnings

Table 37 Troubleshooting Ceilometer

Status Message Info	Probable Cause	Remedy
Optics contaminated warning (on handheld terminal).	Bird droppings, leaves, dust, or the like has contaminated the window.	Clean the window.

Failure Diagnosis

In case of malfunction, do the following:

1. Check the cable connections.
2. Check the presence and correctness of line voltage.
3. Check the operational states of the LEDs in the unit.
4. At the data line, check that the connection is correct.

The diagnosis is made based on the information given in the status message.

PWD11A

CAUTION	Servicing the equipment must be performed by qualified personnel.

If PWD11A is not working properly:

1. The lenses may be excessively contaminated. Alarm is received.
   - Clean the lenses.
2. One of the hoods has been filled with snow, leaves, or other things. Alarm is received.
   - Clean the hoods.
3. Check that there are no foreign objects in the sample volume.

- Tree branches, loose cables, or any other moving objects in the sample volume may cause sudden changes in the scatter signal.

4. Check the power supply voltage and cable connections.
5. Check that all the connectors are properly inserted.
6. Check that there are no flashing lights close to PWD11A.
   - Flashing lights may cause PWD11A to detect peaks in the optical signal.

SA20M

Table 38 Troubleshooting SA20M

Problem	Probable Cause	Remedy
No data transfer from SA20M	Bad connection.	Check that all cables are properly connected to SA20M.
	Cable failure.	Check cable integrity.
	No power.	Restore power to SA20M.
	Poor siting of SA20M. Too close to obstruction (such as metal fences) that is causing signal degradation.	Remove any obstructions.
SA20M appears to be reporting lightning data in the opposite direction of the expected location (180 degrees off).	The sensor is not properly grounded.	Check the grounding connection wire.

Handheld Terminal

Table 39 Troubleshooting the Handheld Terminal

Problem	Probable Cause	Remedy
The handheld terminal does not power up normally.	The handheld terminal is not connected to a power outlet.	Check the cable connections.
The backlight is not on.	After a certain time, the lights will go off to maintain low power consumption.	Press any key on the keypad.
The "Not Available" text appears on the screen.	Your system does not have the Enhancement sensors connected.	Connect the sensors. If you have the Basic system, ignore the text.
You are trying to change station dependent settings, but you cannot access the input field.	A communication problem between MAWS and the handheld terminal.	Check the cable connections. The handheld terminal must be connected to MAWS with a hard wire, when changing the station dependent settings.

Technical Support

For technical questions, contact the Vaisala technical support:

E-mail helpdesk@vaisala.com
Phone (int.) +358 9 8949 2789
Fax +358 9 8949 2790

Return Instructions

If the product needs repair, please follow the instructions below to speed up the process and avoid extra costs.

1. Read the warranty information.
2. Write a Problem Report with the name and contact information of a technically competent person who can provide further information on the problem.
3. On the Problem Report, please explain:
   - What failed (what worked / did not work)?
   - Where did it fail (location and environment)?
   - When did it fail (date, immediately / after a while / periodically / randomly)?
   - How many failed (only one defect / other same or similar defects / several failures in one unit)?
   - What was connected to the product and to which connectors?
   - Input power source type, voltage and list of other items (lighting, heaters, motors etc.) that were connected to the same power output.
   - What was done when the failure was noticed?
4. Include a detailed return address with your preferred shipping method on the Problem Report.
5. Pack the faulty product using an ESD protection bag of good quality with proper cushioning material in a strong box of adequate size. Please include the Problem Report in the same box.
6. Send the box to:
   Vaisala Oyj
   VSO Service
   Vanha Nurmijärventie 21
   FIN-01670 Vantaa
   Finland

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CHAPTER 6

TECHNICAL DATA

This chapter provides the technical data of the TACMET Weather Station for Pole Mast Installations.

Polling/Reporting Times

Table 40 Sensor Polling/Reporting Times

Parameter	Polling	Reporting
Wind direction (WS425)	1 s	5 s
Wind speed (WS425)	1 s	5 s
Air temperature (QMH101M)	10 s	1 min
Relative humidity (QMH101M)	10 s	1 min
Air pressure (PMT16A)	10 s	1 min
Precipitation (QMR101M)	1 min	1 min
Lightning (SA20M)	5 s	5 s
Sky condition (CT25KAM)	30 s	30 s
Present weather (PWD11A)	30 s	30 s

Specifications

Weather Station MAWS201MP

Table 41 MAWS201MP Specifications

Property	Description/Value
AC power consumption	260 VA, max. 2.3 A @ 115 VAC 1.15 A @ 230 VAC
Battery backup time	4 h, at minimum (excluding PC equipment; optional UPS for PC equipment)
Communication range with the QCA101 unit equipped with WT501+DMX501	20 km (12 mi.) with AWG 22 cable
Temperature	-40 ... +55 °C (-40 ... 131 °F)
Humidity	5 ... 100 %RH
Wind	0 ... 50 m/s (0 ... 100 knots)

Logger QML102T

Table 42 QML102T Specifications

Property	Description/Value
Processor	32-bit Motorola
A/D conversion	16-bit
Data logging memory	1.7 Mbytes internal Flash memory
Sensor inputs	10 Analog inputs (20 single ended inputs) 2 counter / frequency inputs Internal channel for PMT16A pressure transducer
Typical accuracy across measured temperature range -50 °C ... +80 °C	Better than ± 0.06 °C
Maximum error across measured temperature range -35 °C ... +50 °C	Less than ± 0.12 °C
Maximum error at 0 °C	Less than ± 0.06 °C
Voltage measurement ±2.5V range ±250 mV range ±25 mV range ±6.5 mV range	 Better than 0.08 % F.S. ± 150 µV Better than 0.18 % F.S. ± 15 µV Better than 0.18 % F.S. ± 3 µV Better than 0.18 % F.S. ± 3 µV
Frequency measurements	0.003 % + resolution 241 ns (up to 2 kHz)
Common mode range	+5 V / -4 V
Real-time clock Standard	 Better than 20 sec/month
Serial communication Standard Optional	RS-232 for maintenance 2 pcs RS-232 for handheld display and laptop PC (max. distance 70 m) 2 pcs RS-485 for smart sensors and remote displays, speed 300 ... 4800 bps (max. distance 2.5 km)
Voltage (external powering)	8 ... 14 VDC recommended (30 V max)
Standard internal battery	1.2 Ah/6 V
Temperature (operating)	-40 ... +55 °C (-31 ... 131 °F)
Temperature (storage)	-50 ... +70 °C (-58 ... 158 °F)
Humidity	0 ... 100 %RH
Emissions	CISPR 22 class B (EN55022)
ESD immunity	IEC 61000-4-2
RF field immunity	IEC 61000-4-3
EFT immunity	IEC 61000-4-4
Surge (lightning pulse)	IEC 61000-4-5
Conducted RF immunity	IEC 61000-4-6

Power Supply and Connection Unit QMP202MP

Table 43 Battery Regulator QBR101 Specifications (Inside QMP202MP)

Property	Description/Value
Maximum input voltage (SMPS and Solar Panel inputs)	30 VDC
Maximum input current (SMPS)	6 A
Solar panel input	55 W max.
Recommended input voltage from SMPS input	16 VDC
Max. load current (backup output)	3.5 A
Recommended battery capacity range	4 … 72 Ah
Battery charge current for 4 Ah battery (selections 0.5 / 1.0 / 2.0 / 2.5 A)	0.5 A
Max. battery discharge current	3.5 A
Battery charge voltage selection (with external resistor)	13.7 V
Battery charge temp. comp. Coefficient	-20 mV/°C, typical
Load disconnection threshold voltage (with Lo Btry Switch)	10.0 V, typical
Load reconnection threshold voltage	12.0 V, typical
Battery Low signal threshold voltage	11.5 V, typical
Self consumption from battery (with LEDs disconnected)	0.2 mA max. @ +25 °C
Ground connection	Negative
Reverse voltage protection	Battery, solar panel
Wire terminals - battery and load wires - solar panel, DC input, and controls	Screw terminals, removable 2.5 mm^2 1.5 mm^2
MTBF (parts stress method, MIL.HDBK 271F ground benign Ta +25 °C)	> 150 000 hours
Housing	Anodized aluminum, gray
Dimensions w × d × h	90 × 80 × 25 mm (3.5 × 3.1 × 1 in)
Weight	0.1 kg (3.5 oz)

Table 44 Power Supply Unit BWT36SXZ Specifications (Inside QMP202MP)

Property	Description/Value
Output power	30 W
Operating principle	SMPS
Input voltage range	85 … 264 VAC
Frequency range	47 … 440 Hz
Input current on full load: 100 VAC 230 VAC	 0.6 A 0.4 A
Output voltage	+36 V, adjustable ± 10%
Output current	0.9 A
Efficiency	81 %
Noise and ripple	(Output V × 0.01) + 50 mV_{p-p}, max.
Input regulation	0.8 % max.
Load regulation	0.9 % max.
Temperature coefficient	± 0.03 %/°C
Output voltage rise time	200 ms max. at +25 °C
Hold-up time	20 ms min. at +25 °C
Over current protection	Foldback, automatic recover
Switching frequency (110VAC/230VAC)	50 kHz/80 kHz
Electrical strength/ isolation: Input - Output Input - Chassis Output - Chassis Input - Output - Chassis resistance	 3 kV AC, 1 minute 2.5 kV AC, 1 minute 500 V AC, 1 minute 50 MΩ minimum
Leakage current	0.75 mA max.
Operating temperature range	-40 ... +60 °C (-40 ... 140 °F)
Weight with chassis	250 g (8.8 oz)
Approvals	UL 1950 CSA 234 (IEC 950) VDE0805 EN 60959 (IEC 950) CE - EMC 89/336 EEC - LVD 73/23 EEC

Table 45 Power Supply Unit BWC15SXZ Specifications (Inside QMP202MP)

Property	Description/Value
Output power	75 W
Operating principle	SMPS
Input voltage range	85 … 264 VAC
Frequency range	47 … 440 Hz
Input current on full load: 100 VAC 230 VAC	 1.7 A 0.9 A
Output voltage	+15 V, adjustable ± 10%
Output current	5 A
Efficiency	84 %
Noise and ripple	(Output V × 0.01) + 100 mV_{p-p}, max.
Input regulation	0.8 % max.
Load regulation	0.9 % max.
Temperature coefficient	± 0.03 %/°C
Output voltage rise time	300 ms max. at +25 °C
Hold-up time	20 ms min. at +25 °C
Over current protection	Current limiting
Switching frequency (110VAC/230VAC)	135 kHz
Electrical strength/ isolation: Input - Output Input - Chassis Output - Chassis Input - Output - Chassis resistance	 3 kV AC, 1 minute 2.5 kV AC, 1 minute 500 V AC, 1 minute 50 MΩ minimum
Leakage current	0.75 mA max.
Operating temperature range	-40 ... +60 °C (-40 ... 140 °F)
Weight with chassis	300 g (10.6 oz)
Approvals	UL 1950 CSA 234 (IEC 950) VDE805 EN 60959 (IEC 950) CE - EMC 89/336 EEC - LVD 73/23 EEC

Table 46 12 Ah Backup Battery Specifications

Property	Description/Value
Type	Sealed, Lead-acid
Nominal voltage	12 V
Nominal capacity	12 Ah (provides minimum of 4-hour service length without AC power)
Self discharge	3%/month
Expected lifetime	4 … 5 years
Dimensions w × d × h	151 × 98 × 94 mm (5.9 × 3.9 × 3.7 in)
Weight	4 kg (8.8 lb.)

Digital Transmitter WT501

Table 47 WT501 Specifications

Property	Description/Value
Type	Low Power Digital Transmitter running 16-bit CPU and ADC
Features	IP30/Nema 1 housing with screw terminals
	Online configurable, parameters stored into a non-volatile EEPROM
	Separately isolated power input, serial input and RS485 I/O
Plug-in connectors	46 pcs on PCB, removable connectors with screw terminals, 1.5 mm^2 maximum wire
Start-up voltage	12 to 50 VDC. Shut down level ≤ 10 VDC, start-up level ≥ 10 VDC 50 V abs. max
Power consumption	With default configuration 15 mA @ 12 VDC in; 7.5 mA @ 24VDC including sensors
	With extreme configuration 50 mA @ 12 VDC in; 25 mA @ 24 VDC
Modem module	25 mA @ 12 VDC in; 12.5 mA @ 24VDC
Power isolation	100 VDC peak (limited by a 100 V varistor to unit case)
RS-485 isolation	100 VDC peak (limited by a 100 V varistor to unit case)
On board	Opto-isolated RS-485 (2-and 4-wire) I/O
Optional	Communication module interface for non-isolated RS-232, isolated RS-485, leased-line modem
Modem and power	Possibility to use modem connection where power and modem data are on the same 2-wire line.
Mounting	30 mm DIN-rail
Weight	0.4 kg (14.1 oz)
Operating temperature	-40 ... +60 °C (-40 ... 140 °F)
Storage temperature	-50 ... +70 °C (-58 ... 158 °F)
Humidity operating and storage	2 ... 95 %RH
EMC	CE compliant
Vibration	According to MIL-STD-167-1

Modem Module DMX501

Table 48 DMX501 Specifications

Property	Description/Value
Modem chip	73K324L
Modem chip crystal frequency	11.0592 MHz
USART clock frequency	11.0592 MHz / 2
Register access	Operated through an 8-bit bus interface
Connection	2-wire Point-to-point line or multidrop modem network
Modem protocols	V.21, 300 bps FSK V.23, 1200 / 75 bps FSK V.22, 1200 bps DPSK
Line interface	Matched to 600 Ω
TxControl signal	Configurable
Supply voltage	5 V (+4.75 ... +5.50 V)
Current consumption Reset / power-down Operation	 9 mA 26 mA
Transmit level	-10 dBm
Maximum distance between modules	20 km (~12 mi.) with 22 AWG standard cable
Operating and storage temperature	-50 ... +70 °C (-58 ... 158 °F)
Humidity	0 ... 100 %RH, non condensing

Handheld Terminal QMD101M

Table 49 QMD101M Specifications

Property	Description/Value
CPU	MC68EC000 24-Bit external and 32-Bit internal address 16-Bit on-chip bus for MC68EC000 bus operations
Power management	Static Design allows processor clock to be stopped
Clock speed	16.54 MHz
System integration	16 programmable peripheral chip selects. Interrupt controller with 13 flexible inputs. Programmable interrupt vector generator. Hardware and software watchdog timer. Lower power mode control.
System RAM	256 Kbytes or 1 MB SRAM
FLASH storage	512 Kbytes, 1 MB, or 2 MB
Display Physical size Pixels Character cell size CG set LCD type	Graphics LCD 89 x 91 mm (3.5 x 3.57 in) 160 x 160 8 x 16 (10 rows x 20 columns) or 6 x 10 (16 rows x 26 columns) 256 PC character set & 16 programmable characters Reflective LCD with programmable contrast
Option for display	EL Backlight
Keyboard	25 KEYS
Size	5 columns x 5 rows
Type	Elastomer (Rubber Dome)
Feedback	Audio speaker
Real time clock	24 Hour plus battery backed Month/Day/Year
Interface	14 pin quick connect micro connector or internal
Data transfer rate	Programmable to 38.4 Kb/s
Handshaking	RTS/CTS, Xon/Xoff by the processor
External power	5 ... 14 VDC unregulated, via RS-232 interface (Pin 1 on the 9 pin RS232 D-Sub via pins 13 & 14 Micro Connector).
Current	17 mA @ 6 VDC typical. 80 mA worst case during FLASH write. 0.6 mA sleep mode
Size	191 x 102 x 33 mm (7.5 x 4.0 x 1.3 in) without case expansion ring
Weight	450 g (1 lb)
Operating temperature	-20 ... +70 °C (-4 ... 158 °F)
Operating humidity	Max. 90 %RH non-condensing

Heated Ultrasonic Wind Sensor WS425

Table 50 WS425 Specifications

Property	Description/Value
Sensor type	Ultrasonic 100 kHz Fully compensated for temperature, humidity, and altitude.
Measuring range	0 ... 56 m/s (0 ... 125 mph, 0 ... 107 knots) 0 … 130 m/s (survival)
Delay distance	Virtually zero
Starting threshold	Virtually zero
Response characteristics	Maximum reading rate: 1 per second Sonic measurement time: 0.2 second Signal processing time: 0.15 second Response time: 0.35 second
Accuracy (wind speed)	±0.135 m/s (0.3 mph, 0.26 knots) or 3 % of reading, whichever is greater
Accuracy (wind direction)	±2 degrees
Resolution (wind speed)	0.1 m/s (0.1 mph, 0.1 knots, 0.1 km/h)
Resolution (wind direction)	1 degree
Power (operating)	10 ... 15 VDC, 12 mA (analog)
Power (heating)	36 VDC ± 10 %, 0.7 A
Heater	Thermostatically controlled heaters in the transducer heads prevent freezing rain or snow build up.
Output (analog wind speed)	10 Hz/0.894 m/s (0 ... 625 Hz at 0 ... 55.88 m/s) (frequency) 10 mV/0.558 (0 ... 1.0 volt at 0 ... 55.88 m/s) (voltage)
Output (analog wind direction)	(0 to V_{ref} at 0 to 359°) (simulated potentiometer) 1.0 ... 4.0 VDC, for 5.0 VDC reference an additional -2° error occurs for angles greater than 291° (reference voltage)
Available averages	1 ... 9 seconds (RS-232)
Dead band (wind direction)	None
Material	Stainless steel body and sensor arms Silicone rubber and PVC transducer heads
Operating temperature	-50 ... +50 °C (-58 ... -122 °F)
Dimensions w × d × h	250 × 286 × 355 mm (9.8 × 11.2 × 13.9 in)
Weight	1.7 kg (3.7 lb)
Mean time between failure (MTBF)	26 years calculated per the standard assumptions of MIL-HDBK-217, Revision E.
EMC compliance	EMC standard EN61326-1:1997 + Am1: 1998; Generic Environment

Pressure Sensor PMT16A

Table 51 PMT16A Specifications

Property	Description/Value
Accuracy	± 0.3 hPa incl. one year drift (with factory calibration)
Pressure range	600 ... 1100 hPa
Operating temperature	-40 ... +60 °C (-40 ... 140 °F)

Air Temperature and Relative Humidity Sensor QMH101M

Table 52 QMH101M Specifications

Property	Description/Value
Range (Temperature)	-40 ... +60 °C (-40 ... 140 °F)
Range (RH)	0 ... 100 %
Accuracy (Temperature)	Better than ± 0.3 °C
Accuracy (RH)	± 2 %, 0 ... 90 % ± 3 %, 90 ... 100 %

Rain Gauge QMR101M

Table 53 QMR101M Specifications

Property	Description/Value
Sensor/transducer type	Self-emptying tipping spoon/magnet
Funnel diameter	159.6 mm (6.28 in)
Orifice (opening area)	200 cm^2 (31 in^2)
Sensitivity	0.2 mm (1/128 in)
Capacity	144 mm/h (5.7 in/h)
Accuracy < 24 mm/h < 120 mm/h	 < ± 5 % < ± 10 %
Material	UV stabilized plastic
Cable	Included
Weight	380 g (13.4 oz)

Ceilometer CT25KAM

Table 54 CT25KAM Specifications

Property	Description/Value
Measurement range	0 ... 25 000 ft (0 ... 7.5 km)
25 000 ft acquisition time	15 s
Accuracy (against hard target)	± 2 % ± 1/2 × [resolution]
Resolution	50 ft
Number of layers	Up to 5
Range gates	500
Laser	Pulsed diode, InGaAs MOCVD
Wavelength	905 nm ±5 nm at 25 °C (77°F)
Eye safety	In compliance with IEC825 and 21CFR1040
Measurement cycle	Programmable 15 ... 120 s
Microprocessor	Intel 16-bit CMOS 80C188EB
DC power consumption total measurement unit window blower	 20 W 15 W 5 W
AC power	115 or 230 VAC, 45 ... 65 Hz max. 240 W including heating, ± 15 %
Interfaces	RS-485
Data messages	Cloud hits and status only. Cloud hits, status, internal monitoring data, and full backscatter profile.
Dimensions w × d × h	316 × 256 × 710 mm (12 × 10 × 28 in)
Weight	14.5 kg (32 lb.)
Tilt correction sensor	Correction 0 ... 60°
Window conditioner	Automatic window blower and protection shield.
Temperature range	-50 ... +60 °C (-58 ... 140 °F)
Humidity	0 ... 100 % RH
Protection class	IP65
Vibration during operation	0.5 G, 10 ... 500 Hz (IEC68-2-6 FC)
EMC/EMI	CISPR 22B/FCC 15 Part J or IEC801-5 (2 kV), 3 V/m 14 kHz-1 GHz IEC801-3 IEC 801-4 Level 3
Static	8 kV (IEC801-2 Level 4)
Electrical safety	EN60950

Present Weather Detector PWD11A

Table 55 PWD11A Present Weather Detector Specifications

Property	Description/Value
Measurement range of MOR	10 ... 20 000 m (32 ... 65 600 feet)
Accuracy	±10 %, range 10 ... 10 000 m (<32800 ft) ±15 %, range 10 ... 20 km (32800 ... 65600 ft)
Maximum power consumption	15 W without heating, max 20 W 10 ... 50 VDC
Time constant	60 seconds
Update interval	15 seconds
Precipitation detection sensitivity	0.05 mm/h or less, within 10 minutes
Weather type identification	7 different types of precipitation (rain, freezing rain, drizzle, freezing drizzle, mixed rain/snow, snow, ice pellets) Precipitation (unknown type) Fog (mist), haze (smoke, sand) or clear
Weather type reporting	WMO code table 4680
	Code letters for precipitation, NWS (National Weather Service, USA)
Precipitation intensity measurement	Range 0.00 ... 999 mm/h
	Accuracy ±30 % (range 0.5 ... 20 mm/h, liquid precipitation)
Sun orientation	Sunlight into the light receiver must be avoided
Material	Anodized aluminum, black
Wind speed	Up to 60 m/s (116 knots)
Operating temperature range	-40 ... +55 °C (-40 ... 131 °F)
Operating humidity range	Up to 100 %RH
Dimensions w × d × h	720 × 320 × 220 mm (28.3 × 12.6 × 8.66 in)
Weight	2.8 kg (6.17 lb.)

Lightning Detector SA20M

Table 56 SA20M Specifications

Parameter	Description/Value
Types of strikes detected	Cloud-to-cloud Cloud-to-ground
Maximum processing rate	5 000 strikes per minute
Operational Limits Range Bearing	 0 ... 90 km (0 ... 50 nmi.) 0º ... 360º
Resolution: Range Bearing	 2 km (1 nmi.) 1 degree
Ranging accuracy	± 1 km (0 ... 28 km); ± 0.5 nmi. (0 ... 15 nmi.) ± 2.4 km (28 ... 55 km); ± 1.3 nmi. (15 ... 30 nmi.)
Directional accuracy	± 5º
Power	10 ... 18 VDC, 7 W, 0.5 A (typ) @ 13.8 VDC
Transient voltage surge protection	All lines
Weight	3.6 kg (8 lb.)
Dimensions w × d × h	310 x 310 x 130 mm (16 x 16 x 5 in)
Temperature	-35 ... +55 °C (-30 ... 130 °F)
Humidity	5 ... 100 %RH condensing
Standards	FAA Advisory Circular 150/5220-16 RTCA/DO-191 TSO-C110a

Obelux Obstruction Light

Table 57 Obelux Obstruction Light Specifications

Property	Description/Value
Intensity	17 cd typical
Radiation pattern	360° horizontal 50° vertical
Illumination threshold	200 lux (adjustable)
RF-radiation	None
LEDs	14 separate groups
Power consumption	< 2 W
Current consumption	< 0.17 A
Height	235 mm (9.25 in)
Diameter	120 mm (4.72 in)
Glass cover thickness	5 mm (0.2 in)
Operating temperature range	-55 ... +55 °C (-67 ... 130 °F)

Tiltable Pole Mast

Table 58 DKP210AV-T Specifications

Property	Description/Value
Height	10 m (32.8 ft)
Maximum wind speed with two sets of guy wires	 67 m/s (130 knots)
Diameter Lowest section (0 ... 1.9 m) Second section (1.9 ... 4.9 m) Third section Highest section Top of the mast	 100 mm (3.94 in) 75 mm (2.95 in) 63 mm (2.48 in) 50 mm (1.97 in) 60 mm (2.36 in)
Mast tubes and lifting rod	Aluminum alloy
Pedestal tube and hinge	Stainless steel
Other parts, e.g., bolts	Stainless steel
Guy wires Material Breaking strength Marking	 Stainless steel 28 kN (6 295 lbf) Black and yellow colored cable shrouds to the height of 2 meters from the ground
Foundation set Material Thread of foundation bolts Length of foundation bolts Wedge bolts	 Galvanized steel M20 300 mm (11.8 in) M20, cast or drilled into concrete using the provided orientation plate as a guide
Coating/Painting Pedestal tube and hinge Aluminum parts Steel parts Stainless steel parts	 Corrosion-resistant powder coating Anodized and painted Galvanized Uncoated
Mast concrete base	Soil bearing capacity must exceed 45 kPa
Weight (pole with winch)	125 kg (276 lb)

Table 59 DKP206AV-T Specifications

Property	Description/Value
Height	6 m (19.7 ft)
Maximum wind speed With one set of guy wires	 65 m/s (126 knots)
Diameter Lowest section (0 ... 1.9 m) Second section (1.9 ... 4.9 m) Highest section Top of the mast	 100 mm (3.94 in) 75 mm (2.95 in) 63 mm (2.48 in) 60 mm (2.36 in)
Mast tubes and lifting rod	Aluminum alloy
Pedestal tube and hinge	Stainless steel
Other parts, e.g., bolts	Stainless steel
Guy wires Material Breaking strength Marking	 Stainless steel 28 kN (6 295 lbf) Black and yellow colored cable shrouds to the height of 2 meters from the ground
Foundation set Material Thread of foundation bolts Length of foundation bolts Wedge bolts	 Galvanized steel M20 300 mm (11.8 in) M20, cast or drilled into concrete using the provided orientation plate as a guide
Coating/Painting Pedestal tube and hinge Aluminum parts Steel parts Stainless steel parts	 Corrosion-resistant powder coating Anodized and painted Galvanized Uncoated
Mast concrete base	Soil bearing capacity must exceed 45 kPa
Weight (pole with winch)	105 kg (231 lb)

TM32 Radio Modem

Table 60 TM32 Radio Modem Specifications

Property	Description/Value
Interface	RS-232 compatible interface. User configurable for common baud rates to 38,400 and parity. Interface does not require hardware handshake control.
Power	External power supply range of 10 ... 26 VDC. RF - 1.2W, 10.2W during TX.
Link rate	2400 or 4800 baud (optionally 9600 baud)
Transmission protocols	Fast asynchronous, transparent, packet switched, digipeater, or TDMA.
Modulation	Gaussian Minimum Shift Keying (GMSK) baseband modulation with programmable transmit BT of 0.5 or 0.3.
FEC protocol	Hamming code (12,8) with data interleave for burst error correction up to 20 consecutive bits in transparent and packet modes of operation.
General radio specifications	Synthesized frequency control. Channel spacing resolution of 6.25, 12.5 kHz, or 25kHz depending on model. Frequency stability of 5 ppm.
Transmitter	Modulation distortion <5%. Duty cycle 100%. Transmitter attack time 10 ms. Spurious and harmonic FM -55 dBc. FM hum and noise -40 dB.
Receiver	Sensitivity -114 dBm (12 dB SINAD). Adjacent channel selectivity -60 dB (25 kHz). Spurious and image rejection -60 dB. Intermodulation -60 dB. FM hum and noise -40 dB. Conducted spurious -57 dBm.
RF connector	Environmentally sealed BNC (50 W)
Type acceptance	All models are type accepted and certified for operation in the U.S. and Canada.
Operating temperature	-22 ... 140 °F (-30 ... +60 °C)
Storage temperature	-67 ... 185 °F (-55 ... +85 °C)
Vibration/Shock	IEC 68-2-55
Enclosure	IEC 144/855420 IP 66 Dust-tight and watertight.
Dimensions w × d × h	70 × 23 × 132 mm (2.75 × 0.9 × 5.2 in)
Weight	255 g (9 oz) excluding cable